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THE AUTOMOBILE

1911 Laboratory Prospects

PURCHASING PUBLIC INTERESTED IN LABORATORY WORK; A. C. A. PERFECTS ITS LABORATORY; MANY MAKERS INSTALLING TESTING EQUIPMENT

CONTRARY to accepted belief in the haunts of the average man, natural laws are fixed, unalterably so, and fortunately they are beyond the pale of the influence of the character of man who labors under the impression that the result of his handiwork is the absolute standard. The real situation is quite different from that of popular belief. When an apparatus is designed and constructed, it then remains for the conduct of final tests of the completed automobiles leading up to a better understanding of the harmony of relations of the component units. These are all matters with which manufacturers are primarily concerned, but it still remains to determine as to the fitness of the completed automobiles from the point of view of road performance and in the light of the intended service. This latter consideration is a paramount is-

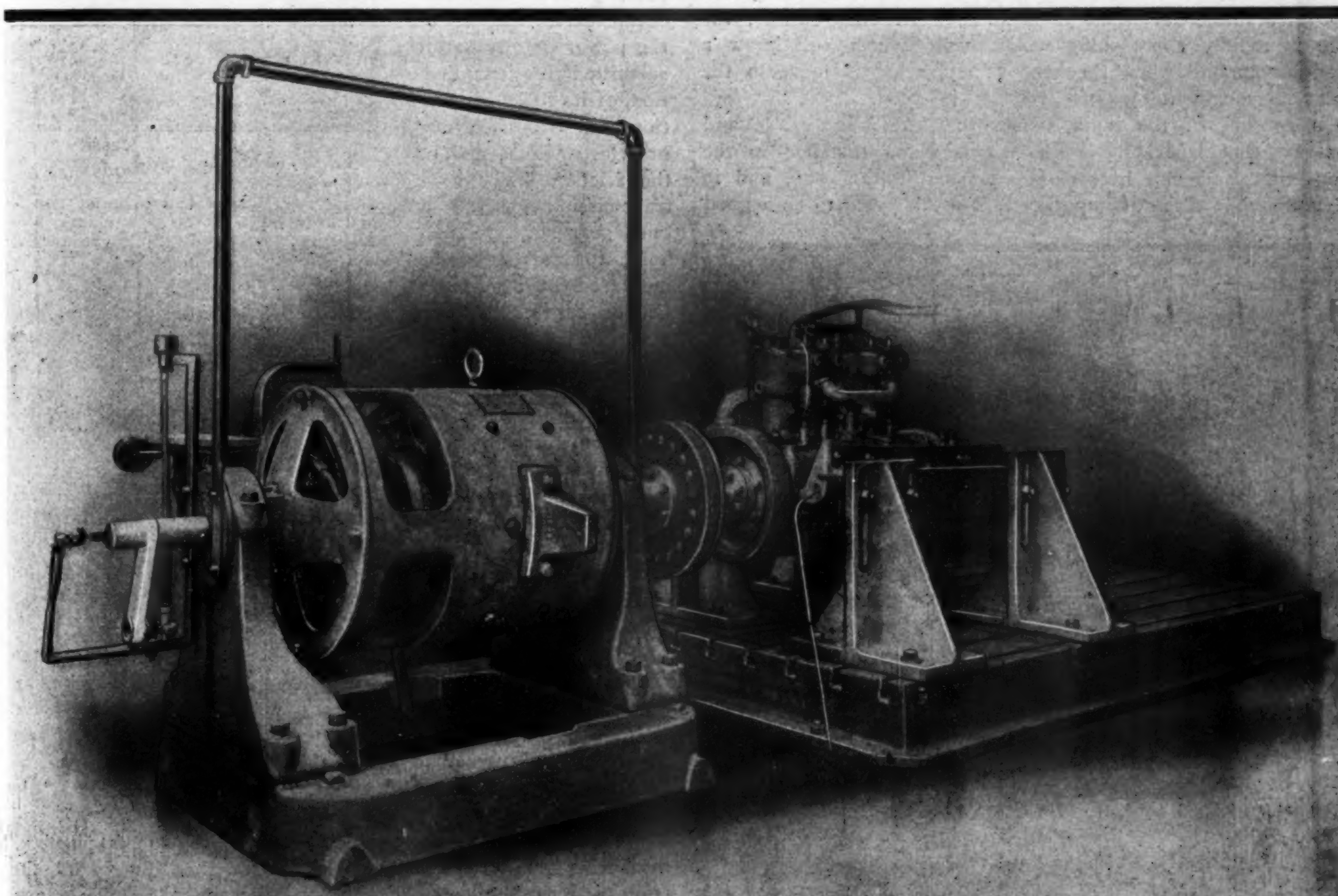


FIG. 1—MOTOR MOUNTED FOR DYNAMOMETER TEST IN APPARATUS INSTALLED BY AUTOMOBILE CLUB OF AMERICA

designer to find out how many natural laws the equipment violates, and to what extent the design offends these laws. The laboratory problem may be divided into three fundamental classifications, *i.e.,* (a) for the investigation of the raw materials that are proposed for use in the construction of machines, as automobiles, (b) for the purpose of determining the extent of compliance of component units with the laws, (c) in the

sue with the purchaser, and on this account users of automobiles, as they are banded together in clubs, combine their individual efforts as a unit with the expectation that the cost of a (common) user's laboratory will not be too much of a burden to carry, but that it will be the source of much light on a relatively dark subject, and beneficial (a) to the user since it will tell him if the automobile he may select is in ac-

cord with the promises made for it by the maker, (b) to the maker in a measure depending upon his willingness to listen to the voice of experience.

It would be a great misfortune were the makers of automobiles, taking them broadly, to find themselves in the predicament which would be in evidence were they to be laggards in the matter of the installation of suitable laboratory equipment, and find themselves in the position of having to listen to disgruntled users. This unfortunate situation is likely to be brought about if clubs install capable laboratory equipment and put it under the charge of skilled physicists, provided the makers build their cars by rule of thumb at the command of coarse practice, rather than in the enlightened atmosphere of the laboratory, at the instance of men who learn what the natural laws portray and bow to the inevitable.

Fortunately, the wheels of progress are not all being turned by the users of automobiles; the clubs, made up of enthusiastic autoists, that spend a part of their surplus by way of the laboratory, in hunting out the bottom facts about the automobiles they ride in, are most likely to discover, when their excellent undertakings are concluded, that they are treading a path that was blazed by the makers' engineers in works laboratories.

The growth of the automobile industry owes much of the rapidity of its expansion to the interest that is displayed in the automobile by the men who have to pay the bill. When the owners of cars elect to spend hundreds of thousands of dollars in laboratory research, it goes to show that they will recognize merit for what it is worth. In other words, the time is rapidly approaching when these owners will know a good automobile when they see it, and what is more to the point, they will know just why it is good.

On account of the rapid strides that are being made and the fact that laboratory equipment is being installed in the shops that were not heretofore equipped in this way, and in the automobile clubs of importance, it would seem to be a good subject to enlarge upon at some length, perhaps, the idea being to advise the makers of cars of the preparation that is being undertaken by users to enable them to find out where they stand, with the further understanding that users of automobiles, since they appreciate the utility that resides in a well-equipped laboratory, be put in possession of the latest facts as they refer to laboratory practice.

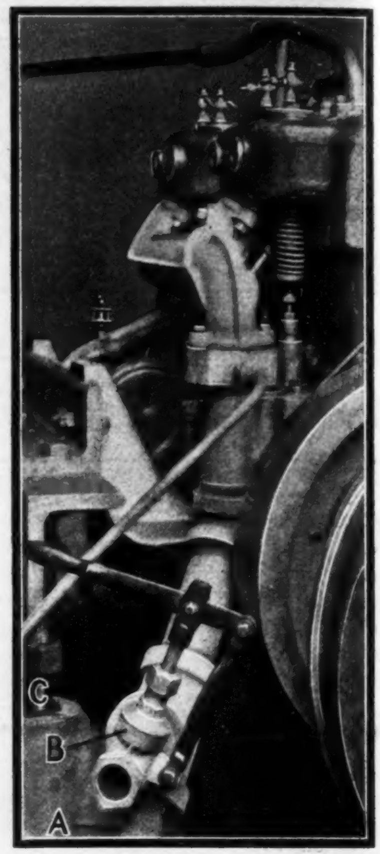


Fig. 3—Exhaust pipe A leading to flue with branch attachment B for taking samples of the exhaust gases. To the left one of the jackscrews C of the supports for adjusting the height of angle irons

A new apparatus has been installed in the testing laboratory of the Automobile Club of America under the direction of A. L. McMurtry, chairman of the Technical Committee, by means of which it is possible to obtain accurate determinations of the power of any motor submitted for examination, of its fuel consumption, with one carbureter or with another, and of the friction losses in a transmission operated at one gear or another. The torque may be measured at any number of revolutions between 500 and 2,000, and the fuel consumption at any adjustment of the carbureter which produces any given number of revolutions with a certain load, and, so far as fuel consumption is concerned, the speed of the motor may be below 500 without interfering with the accuracy of the measurement. The present arrangements provide for coupling the armature shaft of a Diehl dynamo with the flywheel of the motor by means of a coupling plate and suitable joints, and is applicable to a large number of motor flywheel equipments without change. In the case of motors provided with fan-spoked flywheels or with multiple-disc clutch, or when connection should be made with the shaft of the transmission gear, these arrangements may have to be modified somewhat in each instance.

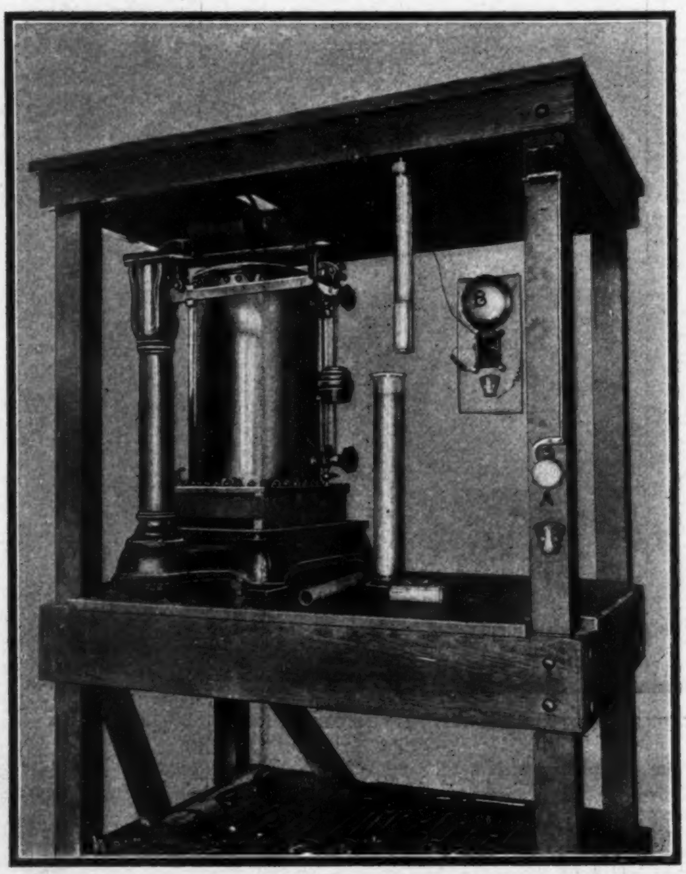


Fig. 2—Gasoline dispensing apparatus and scales with electrically operated stop watch attachment A, and bell B; feed pipe to carbureter not shown

If it is desired to measure the power of an automobile at the rims of the rear wheels, including all the variations which may be due to tire qualities, different degrees of inflation of the tires, slippage, and some other factors, which are usually of less interest to the owners or makers of automobiles than the efficiency of motor and transmission mechanism, the club's old and more complicated testing apparatus may still be used, and the difference in the results obtained by the new apparatus measuring the efficiency of the motor or the motor with the transmission alone, on one side, and, on the other side, those obtained by the old apparatus measuring the driving power of the same motor and transmission, after this power has undergone the reductions due to the factors referred to, may sometimes be of interest, mainly as a means for determining the value of those latter factors under different circumstances.

The main elements in the new testing apparatus are: The bed plate in which the supports for the motor to be tested are adjustably secured; the adjustable supports; the coupling, or means for connecting the motor shaft with the armature shaft; the dynamometer; the spring scale for sight readings of the torque;

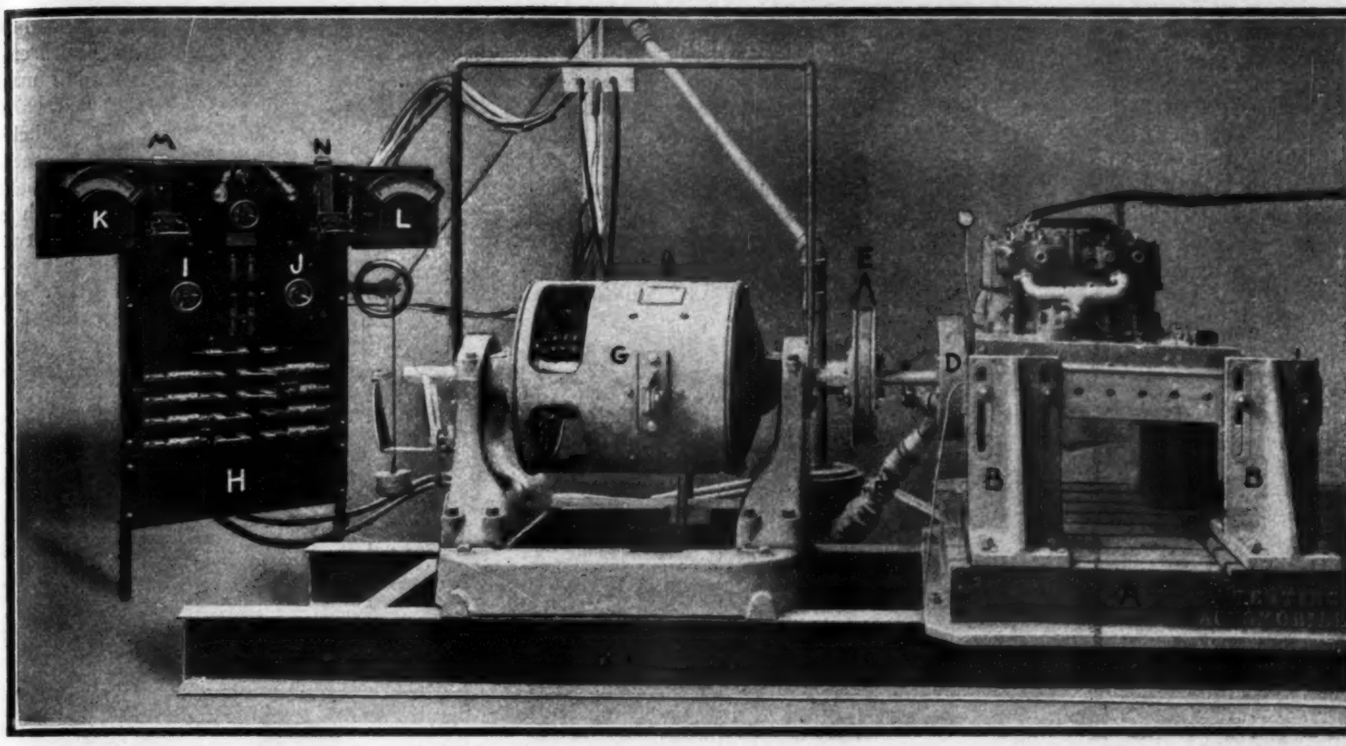


Fig. 4—Testing apparatus showing motor mounted for testing, the coupling device, the dynamometer and the switchboard. A, bedplate; B, supports; C, motor; D, flywheel; E, studded plates driving connection; F, exhaust pipe; G, dynamometer with wiring to switchboard; H, switchboard with rheostats I and J, voltmeter K, ammeter L and interrupters M and N

the Fairbanks scale for determining the same factor with precision within one-tenth of one pound; the Warner tachometer for sight readings of the motor speed; a Veeder counter with a trigger device for positively counting the number of revolutions for a given time; switchboard for regulating resistance to operation of the dynamo and incidentally permitting experimenting with the carbureter and throttle; a tank with water and soda in which the current produced by the motor under test is taken from the switchboard and dissipated in the work of separating the water into its constituents; a gasoline weighing and dispensing apparatus with stop-watch attachment permitting to ascertain the exact weight of gasoline which flows to the carbureter in a given time, such as one minute or twenty minutes, the latter being a standard period for one test.

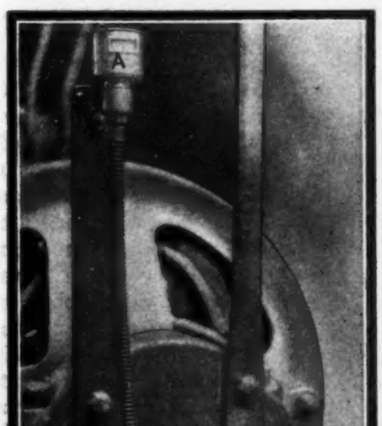
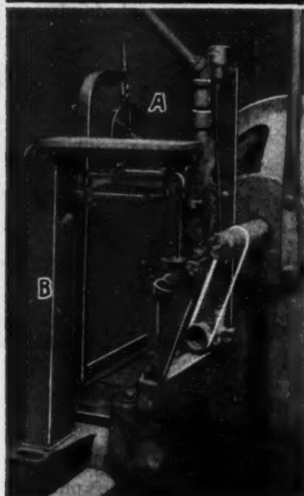


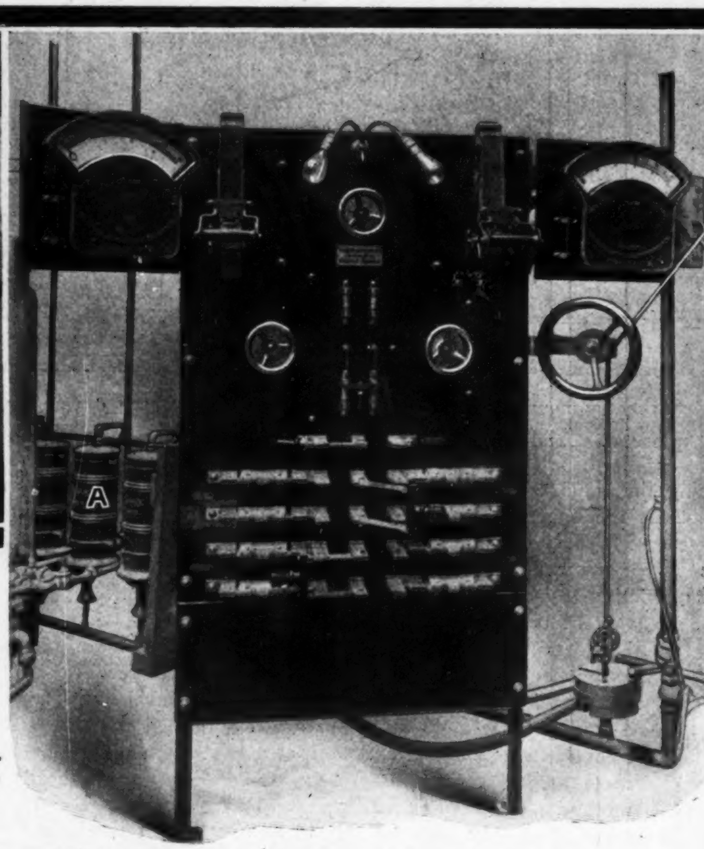
Fig. 5—Free end of armature shaft with tachometer A operated by belt B and counter C connected with or disconnected from shaft by trigger D

Suitable printed blanks for registering the various measurements and the exact conditions under which they are taken also form a part of the equipment, and a sharp distinction is made between blanks provided for non-certified tests which may be carried on by the owner of a motor, a carbureter or a transmission mechanism with the assistance of the laboratory engineer, but which may not be published or in any manner used for trade purposes, and, on the other hand, the fully certified tests in which all steps are taken under the direct and constant supervision of the laboratory directors.

The bed plate is a very substantial cast-iron structure on a wooden foundation and measures about six and one-half feet in length by five feet in width, as estimated by the eye, affording room for even very large motor plants. The upper portion of this bed is crossed lengthwise with nine T-grooves and crosswise with three, the T-portion being downward so as to afford room for the heads of the bolts by which the supports are secured, while permitting the bolts to be slid from one position in the grooves to another, according to the place where the supports should be fixed, first in order to fit with the crankcase brackets of the motor, and, in the final adjustment, to produce perfect alignment of the shafts. The dimensions of all the parts, including the bolts and nuts, are designed with a view to obviating or absorbing vibration. Adjustment of the supports is facilitated by having the bolts work in slots in the supports as well as in the bed plate. An angle iron plate connects the pair of supports on each side of the motor and may be secured higher at one end than at the other, for the case that the crankshaft has a downward tilt and is not parallel with the resting faces of the brackets. To the angle-iron plate with flat top may be bolted another angle iron, as in the illustrations, for the more substantial mounting of motors designed to be mounted in this manner in an automobile frame or subframe. The height adjustment is facilitated by jackscrews in each support, the screws impinging against the lower angle iron, and the adjustment being secured by bolts working in vertical slots in the supports, as plainly shown in the illustrations. By the means described it is possible to bring the center of the motor shaft in exact continuation of the armature shaft, provided there has first been secured to the face of the flywheel a true, concentric flange plate, fitting over the coupling plate which is part of the device employed for uniting the motor with the dynamometer shaft. The driving connection between these two elements consists in two studded plates fitting together so as to stagger the studs of the driving plate in relation to the studs of the driven plate and winding a leather belt or a rope

in and out, and over and under the studs. To this well-known, slightly flexible form of coupling there has been added a circumferential leather strip, as shown in the illustrations, which, however, plays no part in the coupling, but may serve to prevent the clothes of operators from being entangled with the revolving plates. The end of the armature shaft is provided with a cylindrical sleeve surrounding the joint connecting with the coupling, and the latter is provided with a cylindrical flange fitting loosely to the said sleeve, so that the height of the two axes will remain the same while adjustments are made and after. It is stated that no appreciable heat is generated in any part of this coupling arrangement, and that consequently there is no loss of work there.





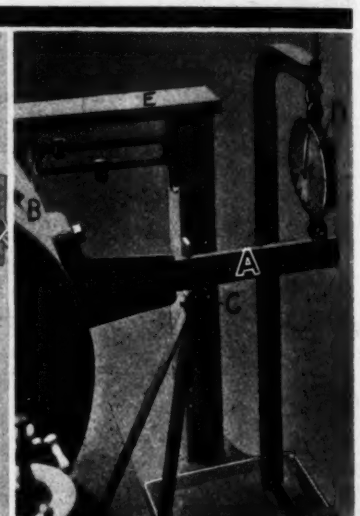


Fig. 6—Showing spring scale A mounted on Fairbanks scales B
Fig. 7—Switchboard with water heating apparatus A
Fig. 8—Showing adjustable arm A of the dynamometer field housing B with stop C and spring scale D mounted on Fairbanks scale E

The dynamo is a Diehl, type 10, rated at 230 volts and 196 amperes, and consequently capable of handling slightly more than 45 kilowatts or about 60 horsepower. Its efficiency is guaranteed to remain constant between 500 and 2,000 revolutions. The free end of the armature shaft projects about one foot, and at this end are connected the Warner tachometer which permits a close estimate of the speed at a glance, and the Veeder counter which is operated only when a trigger is pulled establishing the connection with the shaft. By operating the trigger at the same time as the gasoline meter records a certain weight in the gasoline tank and disconnecting the counter after a certain elapsed time, when the meter again records the weight, the fuel consumption may thus be ascertained for a given number of revolutions and may be compared with the power rating recorded at the scales under the same conditions.

The housing of the dynamo field is provided with two diametrically opposite arms, one of which at a certain adjustable distance from the axis of the dynamo is attached to the operating rod of the spring scales, depressing it and producing a scale reading which may be observed in its variations from time to time, if such variations occur. The motion of the field and of the two arms is limited by an upper and lower stop, but within these limits the power of the rotation corresponds, of course, to the torque developed, and the scale-reading in conjunction with the radius at which it is produced and the known efficiency of the dynamo enable the operator to determine at a glance the horsepower developed. For greater accuracy the spring scales are mounted upon a Fairbanks scale, and the spring scale pull may, therefore, at any time of the test be balanced to within one-tenth of a pound. It is this latter reading which is used exclusively for deciding the power in certified tests, and it may furthermore be checked by the readings in amperes and volts at the switchboard, or more directly in kilowatts. The switchboard is equipped with the meters giving these measurements, and has obviously large switch contacts, being made by Diehl especially for use in connection with the dynamo and with a view to great variations in the power developed. It has two rheostats, one quite coarse in its adjustments for ready approximation of the resistance required for producing any desired motor speed with a given torque or vice versa, and another with very fine adjustments corresponding in nicety almost with the one-tenth pound accuracy of the Fairbanks scales. In practice, the usual way of operating is to use the rough rheostat for getting approximate motor speeds and powers and to check carbureter adjustments by means of the finer one. Under the present arrangements the current produced is taken away by an electric motor connected with the power shafts used in the garage work of the club, but it is the intention to take it, instead, to a tank with water to which is added washing soda and to let the energy be expended in a chemical reaction, and it is stated by the laboratory engineer, Mr. Reilly, formerly of the Massachusetts Institute of Technology of Boston, that soda is preferable to salt which has been used for the same purpose, as the fumes are harmless, while chlorine fumes resulting from the use of salt as an admixture are obnoxious.

One of the illustrations shows the arrangement of the gasoline dispensing meter, with thermometer and the usual appliances for measuring the specific gravity of the fuel. When the scale on which the gasoline tank is placed has been balanced and a reading taken of the total weight of the tank and its contents for the beginning of a test, it is possible to work the apparatus so that the stop watch will indicate the periods after each of which the automatic scales shall indicate the loss in weight, the actuating means being the electrical connection which also rings the bell at the end of each predetermined period. But it is simpler in practice to have the automatic scales indicate the withdrawal from the tank, and consumption in the motor, of a given quantity of the fuel while at the same time causing the electric connection to operate the stop watch, so as to indicate time elapsed in the consumption of a given weight of gasoline

A Day with the Tire Makers

Left—First process in washing. Center—Pure Para rubber. Right—Store and cutting room

THE making of an automobile tire is one of the most interesting processes in the entire field of motor construction. It is a deep, dark mystery to the average owner of an automobile. He knows in a general way that the gum which forms the chief ingredient of tire structure comes from the tropics. He knows that some tires will run thousands of miles without giving their owner any trouble whatever and that precisely similar tires will vex the spirit, tax the resourcefulness and test the amiability of the owner by their likelihood to blow out or puncture at inconvenient moments.

Only a few years ago the structural strength of automobile tires was so uncertain as to form the principal element of chance in touring. To-day, like everything else in the line of development in motordom, the tires are stronger, more dependable, more uniform and more is expected of them than ever before.

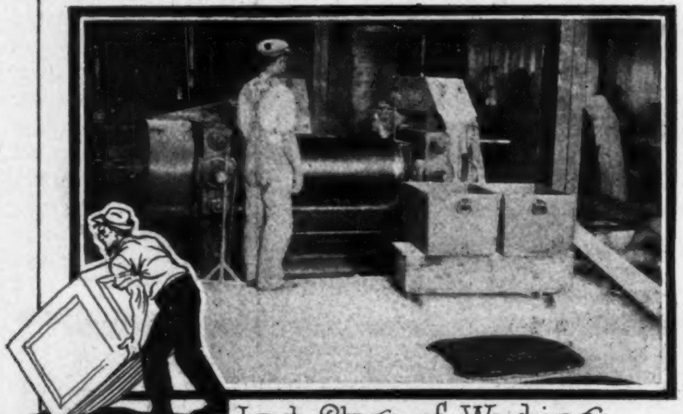
The rubber from which tires are manufactured comes chiefly from the Para district of Brazil, which includes a considerable portion of the low-lying valley of the River Amazon. The Para rubber is said to possess the elemental quality of elasticity to a greater extent than any of the other varieties. Two species of the Hevea Brasiliensis plant are the sources of supply in the Para country. The trees flourish in the equatorial jungles of the Amazon and at this time crude rubber from Para is practically all from wild forest trees.

Next in importance as far as bulk of supply is concerned is the African field. In the Dark Continent there are two distinct varieties of crude rubber supply: the vine called Landolphia and the tree, Kickxia Africana, which flourishes in West Africa.

Central America contributes a large quantity of rubber, called "Centrals" in the trade, the supply being drawn from the tree Castilla Elastica.

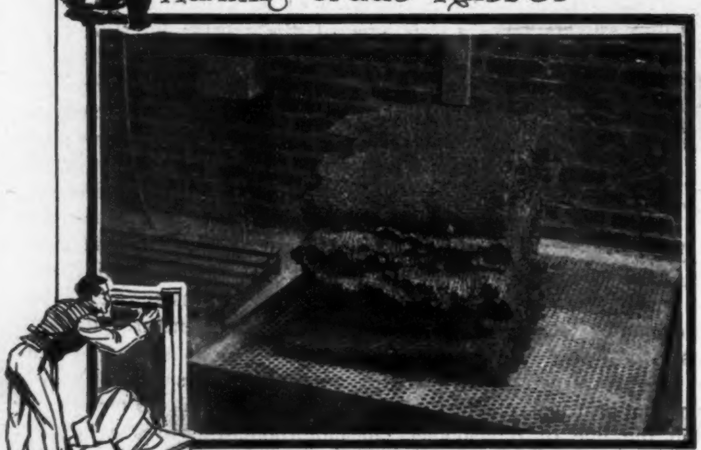
In the East Indies rubber is being cultivated on a large scale, the plants having been transplanted from Brazil. In trade parlance the rubber coming from the cultivated fields of the East Indies is called "Ceylons," and sells in the market almost at the level set by the Para product.

Peru contributes considerable rubber to the general supply, and Brazil, south of the Amazon, is gaining in importance. Madagascar and other tropical islands also produce some rubber.

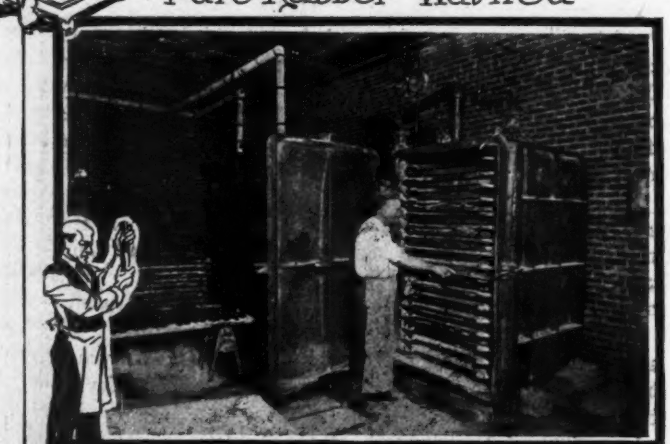


Last Stage of Washing

Washing Crude Rubber



Pure Rubber Washed



Drying Rubber After Washing

Cutting Fabric for Tires

Save in the cultivated plantations of the East Indies and to a certain extent in Central America, the process of drawing and collecting the latex or milk of the rubber-producing plants is the same as it was in ancient times. The laborer simply slashes selected trees with his machete, places half a cocoanut shell where it will catch the milk when it exudes from the wound and proceeds on his way. At regular or irregular intervals the workman goes over his route through the forest and collects the contents of the shells.

Contrary to the statements published in prospectuses issued by get-rich-quick concerns, rubber trees are not really mature until they are from 10 to 12 years old, despite the fact that vast returns are frequently promised after five or six years from the time of planting.

The rubber collected from individual trees varies in amount during a season and but a few ounces of the precious latex flows from the gashed bark into the ready shell between the time it is placed and the time it is collected.

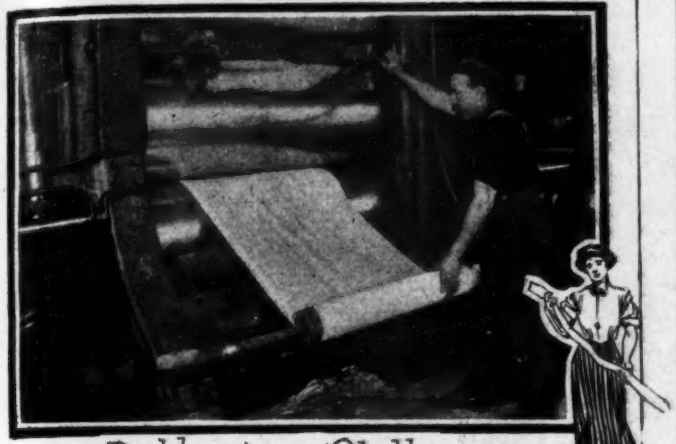
But in the course of his day's work it is not unusual for one man to bring in as much as 100 pounds of the milk.

Of course this does not apply to the plantations where the trees are cultivated, and the crop harvested by scientific means. There, modern machinery has been called into service and the yield of this variety of rubber is constantly increasing.

When the milk has been collected and brought into camp, the next step toward building an automobile tire is the process of smoking and shaping for shipment. A fire of certain grasses and nuts is built and the native workman dips a stick into the milky mass and then exposes the rubber to the action of the smoke and mild heat of the nut-fire. The surface of the rubber is hardened to a certain consistency by the fire and the workman plunges it again into the milk and replaces it in the smoke once more. This process is continued until the ball has grown to weigh from 100 to 200 pounds. When these balls are sliced in two to determine the quality of the rubber and to discover the presence or non-presence of foreign matter, such as stones, sticks, small animals or large vegetables, it is seen that the masses of rubber are in layers of various thicknesses, depending on the consistency of the milk when the mass was dipped and other factors.

Contrary to general belief, vast quantities of this raw rubber are imported directly from the Para fields into the United States. The idea that practically all the raw rubber of the world is shipped to England, Antwerp and Bordeaux is founded in error, for the customs statistics of the United States show that an increasing amount is brought here direct each year.

Rubber is bought by the tire factories, largely by sample, but sometimes on a definite guarantee as to what it will accomplish. With the terrific demand that is being exerted in the market the tendency is to emphasize the former practice and as a result the buyers of tire-making houses are required to be the keenest sort of experts in their line.

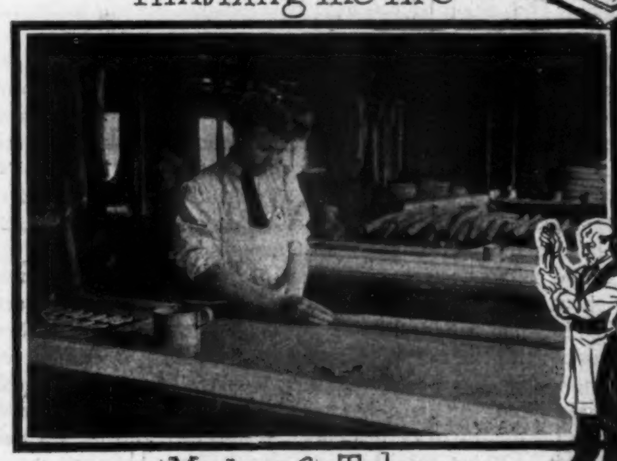


Rubbering Cloth

Stretching Fabric on Tire Form

Vulcanizing

Finishing the Tire



Making Tubes

Having received a shipment of crude rubber at his factory, the superintendent subjects it to the following processes: The split balls are first washed. This process is considerably more involved than the term might seem to imply, for the material comes to hand in the shape of masses that often weigh 100 pounds, when the work is being done with Para rubber. In the case of Africans, the form of the crudest stuff is irregular, varying from small balls to slabs and strings and somewhat similar shape as regards "Centrals."

The washing machines consist of a series of warm cylinders and the cleansing material is pure water. The appearance of the rubber before it goes into the bath is dark brown, with fairly smooth surface and a pungent odor that was given it in the smoke of the nut-fire.

It is rolled and washed and washed and rolled in the machines until all the sand, sticks, dirt and other foreign substances have come away, and then it issues forth in a band that may be as much as four feet wide. Coming from the rolls, the crude rubber takes the trade form of "crepe." It may be half an inch thick and is porous to a degree, somewhat sticky and is considerably lighter in color. This last quality, however, is temporary, for upon exposure to the air the "crepe" darkens somewhat under the action of atmospheric oxygen.

It then goes to the drying machines, where a percentage of the moisture contained in the "crepe" is extracted by gentle heat.

Coming from this process, the rubber is in the form of irregular masses and looks only remotely related to the perfected article.

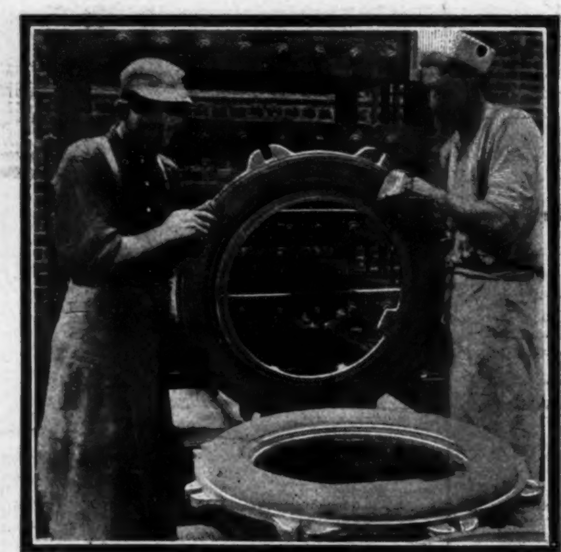
The third step in manufacturing is to subject the product to the process of mastication. This is done with friction rolls, which reduce the mass to a condition of plasticity.

Having been reduced to small grains and shreds, the rubber is run between warm rolls and the admixture of sulphur and other vulcanizing chemicals is introduced. The mass is then rolled out and taken to the calenders or hot presses, where it is shaped into sheets. It is still crude rubber and at this stage of manufacture is called "mixed stock."

From there it goes to the making room, where workmen are ready to convert it into tires and other merchantable articles. In the process of tire-making there is another important element. By weight, automobile tires are composed of from one-quarter to one-third of the stoutest, heaviest kind of cotton fabric.

This fabric is not woven in the tire factory, but is purchased from the cloth weavers in large quantities. Each tire contains from four to six plies of this material. It is made of the longest and strongest fiber of sea-island cotton and in its condition prior to manufacture into tires it seems strong enough to turn buckshot.

Before the actual work of making the tires commences, great quantities of this cotton fabric are associated with "mixed stock"



The Moulds

Putting on the Tire

Joining the Tube

under the pressure of the rolls. When it is ready for tire-making, the cotton fabric is thoroughly impregnated with the rubber and each layer of the material is exceedingly sticky on one of its surfaces. It is called "friction cloth" at this stage.

The process of building a tire is then taken up. A layer of the friction cloth is laid on an iron mould and shaped to meet the various convolutions of the tire. Another is placed upon it and another and another, until the required thickness is secured. This, as has been said, is from four to six plies. On top of the cloth a thick layer of mixed stock is applied and then another single ply of the friction cloth. On top of this mass the main body of the rubber is placed. Tires vary in weight from about ten pounds to thirty-five pounds, depending upon size and amount of material involved.

The tires are shaped on the moulds by the workmen and when the correct size and shape have been given the tire is inspected by the superintendent and taken to the vulcanizer. This is simply a steam press where live heat can be applied to the articles to be made. The action of the heat is to change the chemical status of the rubber.

In the process of vulcanizing, quite a wide range of heat pressure and composition are used. A certain degree of heat is necessary for a certain length of time under certain pressure to get the best results from some of the varieties of work, while there may be a material difference in the treatment of others. The exact details are carefully guarded by the officers of tire factories with regard to the proportion of sulphur used and the intensity of heat applied in the process of manufacture.

Crude rubber freezes at about 40 degrees Fahrenheit and melts at about 120 degrees, but when the heat and sulphur have acted in conjunction to vulcanize the mass, the rubber is made almost impervious to ordinary temperatures. Of course it will still melt if enough heat is applied to it, and it will freeze under some circumstances, but the process of vulcanizing lends to the crude rubber the quality of permanency. It also increases the elasticity. While it is doing this, however, it has likewise taken away a large degree of its convertibility.

Experts say that once rubber is vulcanized it can never be reformed with the ease and satisfaction that were possible before. For this reason, automobile tires made of revulcanized rubber must of necessity be inferior to the goods made of crude rubber.

The finished tires are subjected to a searching examination at the factory and the usual percentage of defective tires so discovered is about 2 in 100.

Tires are tested with a pressure of about 400 pounds to the square inch in several of the well-ordered factories before being sent to the stock-room. It is said that the new tires will withstand a pressure of 1 500 pounds, but such a test is given them only on special occasions.

The making of inner tubes is a much simpler process than that of making the tire-shoes and outer tubes. The inner tubes are made of a single layer of pure rubber. While the delicacy of inner tubes has always been more or less of a problem to motordom, and while strength approximating that of the tire-shoe would be very desirable, such a thing has never been accomplished. A layer of cotton fabric, enclosed between two layers of rubber, would make a marvelously strong inner tube, but unfortunately the presence of the cotton in the mixture would defeat its own ends. The porous fabric would not be gas-tight for any length of time, if at all, and as that one quality is the foundation stone upon which all inner tubes rest, the idea is not regarded as practical.

In the fiscal year of 1909 33,000 tons of rubber, two-thirds of which was from Para, was imported into the United States. During the fiscal year ending June 30, 1910, the imports into this country amounted to 44,000 tons, with the percentage from Para slightly less, although much more in actual pounds. The price this year touched $3.10 for the commercial grades of Para and at present the market is strong at about $2.

The accompanying illustrations were furnished through the courtesy of the Ajax-Grieb Rubber Company.

Foreign News of Interest

CONCLUSIONS OF INTERNATIONAL ROAD CONGRESS—RACE FOR LONG-STROKE MOTORS—EXPERIMENTING WITH THE GNOME MOTOR

MEETING for the second time, the International Road Congress has drawn up a number of conclusions relating to automobiles and the highway. It is of the opinion that touring cars do not cause abnormal damage to the roads providing their speed is moderate. No definition of moderate speed was supplied. Public service vehicles do not cause damage to the road if their speed is kept below 15 1-2 miles an hour, if the greatest axle weight does not exceed four tons, and if the charge does not exceed 330 pounds per centimeter width of rim, for wheels of 39 inches in diameter.

It was believed that commercial vehicles did not cause any damage to properly made highways whenever the following conditions were complied with: for vehicles on which the greatest axle load is 4 tons, where the speed does not exceed 12 miles an hour, and when the weight on the road wheels is not more than 330 pounds per centimeter width of rim for wheels of 39 inches diameter. Where the axle load is between 4 and 7 tons and the weight on the road wheels does not exceed 330 pounds per centimeter width of rim, no damage is done if the speed does not exceed 7 miles an hour. Where wheels of more than 39 inches diameter are employed, the load per centimeter width of rim shall be calculated according to the following formula:

$$c = 150 \sqrt{d}$$

in which d = the diameter expressed in meters, and c = the load expressed in kilogrammes. The congress believed that experiments should be undertaken to determine the maximum width of rim possible on motor vehicles in order to give an even distribution of the load on the road surface.

Ribbed metal tires were condemned as destructive under all circumstances. It was not believed that motor vehicles did any damage to curves provided the road was properly banked at these points and the speed was reasonable.

Long-Stroke Motors to Be Tried Out

The finest collection of long-stroke motors ever gathered in a single race will be seen at the Coupé des Voiturettes speed test to be held at Boulogne-sur-Mer, on Sunday, September 18. The entries are only 13 in number, with little probability of an important increase before the final closing; but what they lose in quantity they gain in quality. The race, which will be run over a hilly triangular course measuring 24 miles, with a total distance of 289 miles, is open to cars with a limited bore. Single cylinders must not exceed 3.9 inches cylinder diameter; two cylinders are limited to 3.1 inches bore; and four-cylinder models must not be bigger than 2.5 inches. Stroke is unlimited, and it is largely owing to this limitation that 2 1-2-inch motors will be produced capable of developing 40 to 50 horsepower, and able to hold their own against racers of three or four years ago having a bore of 6 to 7 inches.

Lion-Peugeot is favorite. The firm has two sets of cars ready, one of them being last year's models composed of two single-cylinder racers and one twin-cylinder V motor. The second set is entirely new and has not yet been seen on the road. The motors have the maximum bore of 2 1-2 inches and a stroke of 11 inches. This is a ratio of 4.3 to 1—the highest ever adopted for an automobile motor.

If there is time to properly tune them up for the race the new four-cylinder models will undoubtedly carry all before them. In view of competition, the firm has very little to say about the power they have been able to get on the bench. It is known, however, that the motor has its cylinders in one casting, multiple valves, and that it runs at over 2,500 revolutions a minute, with a piston speed of not less than 46 feet per second.

The most dangerous rival of the French car is the Hispano-Suiza, built in Spain. Like the Lion-Peugeot it has four cylinders in a single casting, with the maximum bore of 2 1-2 inches. The stroke, however, is slightly shorter, being only 7 4-5 inches. A very high engine speed is maintained, the makers admitting a piston speed of 45 feet.

The only other four-cylinder cars in the race will be supplied by Calthorpe, of Birmingham, England. While having the maximum bore, it is known that their stroke is short compared with that of the French and Spanish cars. They are not expected to make more than a regularity showing. De Bazelaire, Corre La Licorne, and D. S. P. L. will all put single-cylinder cars in the race. A formidable competitor is expected in the Corre La Licorne, with a motor built by Chapuis & Dornier, small motor specialists, and having a stroke of 11 inches for a bore of 3.9 inches. The others will use De Dion-Bouton motors of 3.9 by 10 inches bore and stroke.

Gnome Motor Being Renovated Mechanically

Experiments are now being made at the Gnome factory with a revolving air-cooled motor having mechanically operated intake vales. Up to the present all Gnome motors used on aeroplanes have been fitted with automatic intakes carried in the head of the piston. They have given satisfaction in working, but have the disadvantage of being inaccessible. To dismount them it is necessary to first lock the piston by means of a special tool, then unscrew the intake valve, together with its seating, by a special type of box key. This operation is naturally performed after the detachable cylinder head has been dismounted. As it is possible to screw out the intake without first locking the piston, it sometimes happens that mechanics do not follow the exact instructions for this work, with the result that whenever extra force has to be applied to move the intake valve the connecting rod is bent and the entire engine has to be dismounted. According to the makers, it is to overcome this difficulty, and not because of any dissatisfaction with the way in which the intake valves have done their work, that the mechanical type has been evolved. This latter has not yet completed its tests, and may, therefore, be further modified before being offered to the public.

The makers of the Gnome have secured two patents in connection with their valve mechanism, the first dealing with the method of mounting the valve in its guide and the second the operation of the two valves by a single overhead rocker arm. As on the standard type of motor, the cylinder heads are screwed home. The main rocker arm does not operate directly on the valve stems. It is composed of two parallel members united by transverse pins, and its outer extremity is balanced to equalize the weight of the push rod. Between the two members of the main rocker, and mounted on the same axle, are two auxiliary rockers of very open V-shape, one extremity of which carries a transverse pin acting as counterweight, and also reposing on the two arms of the main rocker; the other extremity receives the stem of one of the valves. The outer extremities of the auxiliary rockers are kept in contact with the main rocker by means of a four-blade flat spring; with the main rocker in a horizontal position both valves are, therefore, closed. The operation is as follows: On the upward lift of the push rod the outer extremity of the main rocker arm is raised, and by the same movement the auxiliary rocker is tipped, opening the intake valve. The pressure of the overhead spring keeps the exhaust seated. On the downward pull of the rod the inner end of the main rocker is raised and with it the secondary rocker operating the exhaust valve.

The cam mechanism has been entirely changed, for in place of the seven male and seven female ring cams, the valves are operated by means of a disc having on its face two concentric cam grooves into which fit "shuttles" carried on the face of the tappet rods. The disc is mounted on the extremity of the mainshaft, within the crankcase, and is driven by means of suitable internal gearing in practically the same way as the ring cams on the standard type of motor. This is a cam mechanism which has already been employed for automobiles, notably by Daimler, and for which no patent is possible.

Instead of the gas entering the crankchamber and being aspired through the valves in the pistons, on the new model it passes along the hollow crankshaft as far as the end plate, where it is aspired through the seven radiating intake pipes in the same plane as the cylinders, and connected to these latter by an aluminum elbow. This, by the way, is the only occasion on which aluminum is employed for the construction of the motor. The lubricating oil pipes are continued along the shaft to the bend, where they discharge their lubricant on the connecting-rod ends. Mechanical intakes should lessen consumption of lubricating oil.

New Epoch in Steel*

ELECTRICALLY REFINED STEEL IS REPLACING ACID OPEN-HEARTH PRODUCT, AND THE IDEA THAT THE CRUCIBLE PROCESS IS EXCLUSIVE FOR TOOL STEEL IS GIVEN A SEVERE JOUNCE

THE dawn of a new era in steelmaking is being heralded abroad, and automobile engineers who have struggled with this problem are awakening to the fact that "jewelry steel," so-called, is to be a regular product before the electrical process is, as might be stated, well in hand. In order to appreciate what the electric furnace is doing for the automobile steel situation, it will be necessary to relate the headway that is being made abroad, and to point out that nearly all German automobiles are now "sporting" electrically refined steel. But if the foreign fabricators of steel are taking kindly to the electrical process, it is also true that the American steel producers of this great commercial necessity are doing the same.

Just how the electric production of steel is to be of benefit to the makers of automobiles is a matter that cannot be elucidated without describing the process at some length, and stating the difference between it and the methods that were formerly relied upon for the fabrication of the better grades of steel. Steelmaking is conducted in the several ways as follows:

(A) Bessemer process.
(B) Basic open-hearth.
(C) Acid open-hearth.
(D) Electric furnace.
(E) Basic open-hearth with subsequent electric refining.
(F) Bessemer process with subsequent electric refining.

The reason why inferior steel is inflicted upon the maker of automobiles is because it is cheaper to produce, and the automobile man, if he is imbued with the economy idea, allows the price to run away with his judgment, or, if he is not well informed, the vendor of the poor grade of steel is enabled to reap a larger profit by selling the same, stating the while that it is amply good for the proposed work.

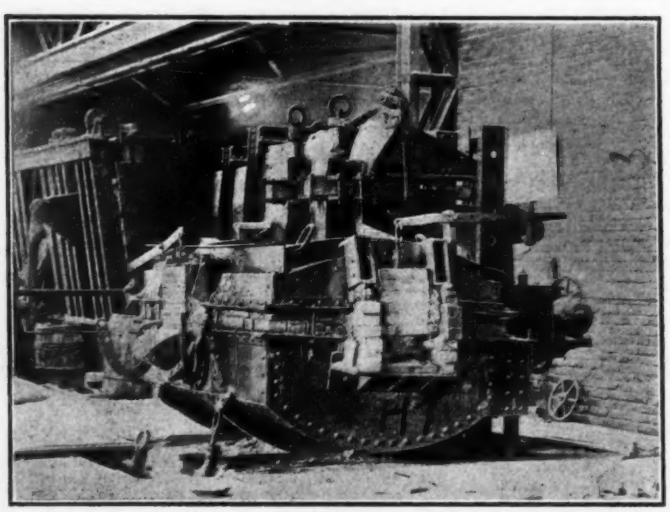


Fig. 1—View of a Héroult furnace. In the background is seen the tiltable acid open-hearth furnace from which the electric furnace is charged with molten steel

*Illustrations and data furnished by Jos. Shaeffers upon his return from Germany.

It is a fact, even if it is not well appreciated, that (in the absence of the electric refining, scavenging process) Bessemer steel ranks lowest in the scale of quality, but it is the most prevalent product and the easiest to procure. Basic open-hearth steel ranks next in the scale of quality, and next to Bessemer steel it is the easiest to obtain. Acid open-hearth steel ranks basic open-hearth steel about as much as the latter ranks Bessemer steel. Crucible steel, if it is as carefully produced as the process will admit of, takes rank with acid open-hearth steel, but if it is made in small quantities, under the most exacting conditions, may even excel. Electric furnace steel is not only taking high rank in the production of superlative brands of steel, but it is doing more. As a scavenging process, in an auxiliary capacity to the basic open-hearth furnace, or to the Bessemer process, this newer way of production is making great headway.

In times gone by, the electric process of producing steel was looked upon as a possibility, but there were many difficulties to be surmounted. A brief résumé of the history of the electric production would be incomplete without referring to one of the very earliest attempts, which was based upon the fact that electric energy may readily be converted into heat energy. It is of course known that:

$H = I^2R\,t \times .24 =$ heat in calories.

In which,

$I =$ the current in amperes.
$R =$ resistance of the circuit in ohms.
$H =$ heat units measured in calories.

It may also be stated that:

$$I = \frac{E}{R}$$

$E =$ electromotive force in volts.

If an alternating current is used, the value of E must be taken as the square root of mean square of the instantaneous voltages, and the value of I will be represented by the square root of mean square of the instantaneous values of the current. The power factor must be noted and represented; it is 100 per cent. when a direct current of electricity is used, and less than this value when an alternating current is employed; just how much less is the point that must be determined; the power factor is equal to 100 per cent. minus the wattless component.

It may be taken for granted that a current of electricity offers a ready means of generating heat. The next point is to remember that the electric arc offers not only the source of heat but the necessary high temperature as well.

Merely having a high temperature available is scarcely enough for the best result. The electric arc offers more; the temperature is not only high but it may be localized; in other words, by proper manipulation the temperature in the slag may be brought to a higher level than that in the body of molten metal.

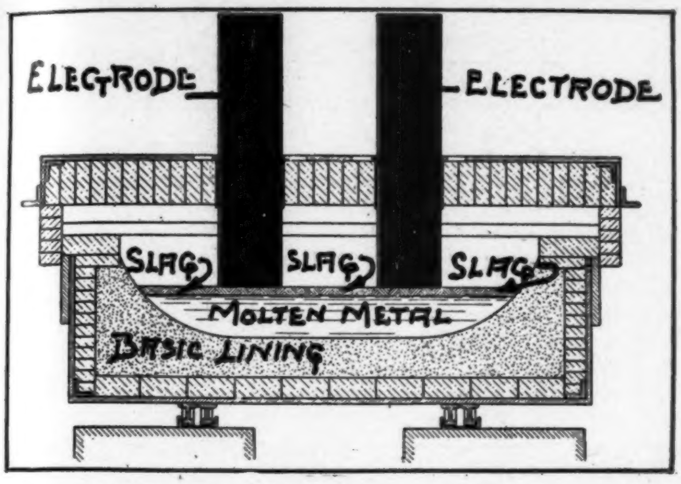


Fig. 2—Sectional view of Héroult furnace, showing layers of metal and slag during refining process.

From the experiments of 20 years ago as conducted in England, down to the process of Héroult, includes the history of a long series of experiments by the most advanced thinkers in the metallurgical field, calling into play a wonderful talent involving the application of the principles of electricity.

The general appearance of the Héroult type of furnace is shown in Fig. 1. This particular equipment is what is known as a 2-t Héroult-Lind furnace. It has the general appearance and many of the characteristics of a tilting type of open-hearth furnace. A section of this furnace is shown in Fig. 2. The two electrodes are each 8 inches square and 48 inches long; they are made of Acheson graphite. The length of the electrodes is sufficient to reach through the cover and dip into the slag, and it is obvious that by lowering the electrodes it is possible to cause them to dip deeper into the slag and even into the metal, and by this process change the main path of flow of the electrical current so that the greatest temperature may be either in the slag or in the body of the metal.

Referring again to Fig. 1 the Héroult furnace is marked H1, and just back of it a tilting acid open-hearth furnace H2 is located, the same being employed as a primary step in the process; the charge from the tilting open-hearth furnace is transferred to the Héroult furnace, where it is electrically refined.

The operation of the open-hearth furnace is no different from ordinary open-hearth work excepting that the process is stopped off as soon as the metal is reduced to the molten state. When the charge is transferred to the electric furnace the real refining begins and by way of a suitable precaution the bath is covered by a suitable thickness of slag which shields the bath from the carbon of the electrodes, some of which (in the process of wasting) remains, but it is mingled with the slag and thereby prevented from dissolving in the molten bath.

As Fig. 2 shows, the normal setting of electrodes is such that the arc is formed between the two electrodes, using the slag as the connecting medium. The heat of the arc is therefore at maximum, due to the high electrical resistance of the slag, and the distribution of heat is through the body of the slag, thence to the molten metal, thus affording a certain uniformity in the heat distribution. An automatic regulating device takes care of the distance between the electrodes and the bath; in the primary setting this distance is 1 3-4 inches.

An Intense Deoxidizing Process Is Carried On

The high heat in the vicinity of the arc induces an intense deoxidizing process which is so localized in the slag and spread out over the surface of the metal mass that the metal is not deteriorated. This process is brought to a complete state of perfection due to the fact that the bath is in constant and energetic circulation, which has the effect of bringing each particle of the metal into intimate relation with the high temperature for a sufficient length of time to complete the deoxidizing process.

The average temperature of the bath as a whole may not be any higher than the temperature as it obtains in other processes; it is the localized high temperature that seems to be efficacious. Deoxidizing is one of the beneficial processes; sulphur and phosphorus are both removed to whatever extent the manipulators desire, and carbon is regulated to a nicety.

Besides refining the steel, the electric furnace offers a most ready means of alloying; the distribution of the alloys is much more uniform and precise and the regulation of silicon, manganese, and carbon is brought down to a certain precision. Since there is no loss of metal to the slag after the same is transferred to the electric furnace, the process of alloying is relatively simple, it being only necessary to add the theoretically right quantity of the respective by-contents.

In the steel works of Richard Lindeberg, Limited, at Remschied-Hasten, Germany, the Héroult process is carried on as an every-day practical proposition, and the experience thus far gained would seem to support the contention that the excellence of the result is not at an undue cost.

Important Characteristics of Electric Furnace Steel

The specific gravity of the steel is higher than that of steel made by the other processes. For equal toughness the carbon content may be higher in this product; the effect of copper and arsenic is less pronounced. The ills attending the presence of sulphur and phosphorus are not so noticeable. Electrically refined steel behaves under the hammer and may be worked at a higher heat with less chance of deteriorating. Owing to the purity of the steel after it is subjected to the refining process it lends itself with great facility under specialized conditions as when it is desired to evolve a high silicon product; upwards of 5 per cent. silicon obtains in some of the brands of steel turned out. This process also works well in the production of aluminum steel; in some cases 2 per cent. aluminum is added.

It will be understood that this process is efficacious particularly in the production of chrome nickel steel and the other alloy products involving the use of vanadium, titanium, tungsten, and such other elements as are found to be efficacious for the purpose. The great purity of the product and the substantially complete elimination of sulphur and phosphorus have a marked bearing upon the procedure; moreover, super-oxidation may be resorted to if desired because deoxidation becomes the final corrective.

As an illustration of the efficacy of the process from the point of view of the removal of sulphur, references may be had to the following recount of the

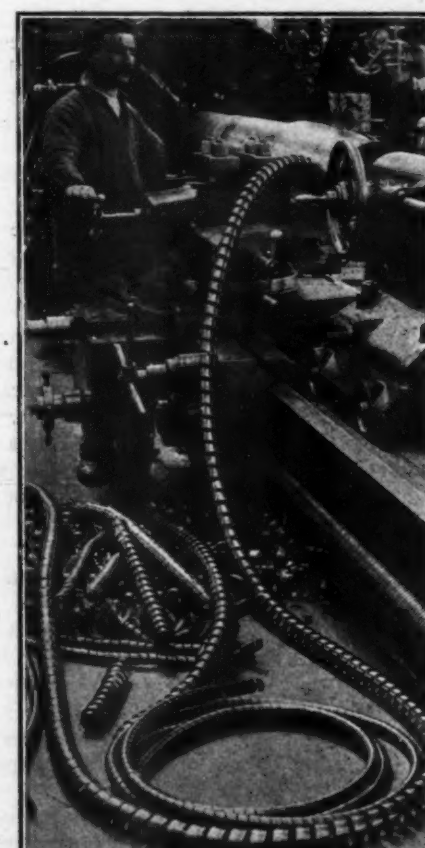


Fig. 3—Illustrating the cutting qualities of high-speed steel

final sulphur content as determined by analysis of 1,000 charges. Another table gives the analysis of electrically refined steel.

RECORD OF 1,000 CHARGES FROM AN ELECTRIC FURNACE

Per cent. of sulphur	No. of charges		
.001	88	743 charges with maximum .010 sulphur	958 charges with maximum .015 sulphur
.002	5		
.003	14		
.004	29		
.005	50		
.006	82		
.007	100		
.008	168		
.009	99		
.010	108		
.011	67		
.012	64		
.013	35		
.014	29		
.015	20		
.016	11		
.017	14		
.018	6		
.019	1		
.020	2		
.021	2		
.022	2		
.023	2		
.025	1		
.026	1		
Charges	1000		

No. of Charge	Carbon		Mangan.		Silicon		Phosphorus	Sulphur	Tungsten	Chromium	Nickel
	Specified	Found	Specified	Found	Specified	Found					
30	1,10	0,99	0,30	0,34	0,20	0,25	0,003	0,007	.....	.....	.....
353	0,95	1,02	0,35	0,38	0,30	0,29	0,002	0,008	.....	.....	.....
359	0,70	0,77	0,30	0,32	0,15	0,16	0,010	......	24,62	6,29	.....
360	1,40	1,38	0,30	0,35	0,25	0,25	0,009	0,010	.....	.....	.....
362	1 05	1,02	0,55	0,52	0,30	0,39	0,008	0,015	.....	.....	.....
829	1,00	1,08	0,30	0,34	0,30	0,33	0,009	0,003	.....	1,33	1,13
831	1,00	0,96	0,35	0,36	0,25	0,28	0,015	0,010	.....	.....	.....
839	0,70	0,68	0,30	0,29	0,15	0,16	0,012	0,012	21,41	4,64	.....
840	1,25	1,16	0,03	0,32	0,20	0,22	0,009	0,005	.....	.....	.....
842	1,00	1,00	0,53	0,54	0,30	0,30	0,010	0,009	.....	.....	.....
845	1,00	1,12	0,55	0,55	0,30	0,33	0,012	0,011	.....	.....	.....
850	0,75	0,81	0,45	0,45	0,30	0,35	0,010	0,005	.....	.....	.....
851	0,75	0,82	0,45	0,41	0,30	0,31	0,009	0,012	.....	.....	.....
854	0,90	0,87	0,33	0,30	0,25	0,24	0,009	0,007	.....	1,34	1,10
855	0,90	0,86	0,35	0,30	0,30	0,27	0,010	0,010	.....	.....	.....
856	0,70	0,67	0,30	0,29	0,15	0,15	0,010	0	23,86	5,54	.....
857	0,95	0,99	0,30	0,33	0,25	0,24	0,007	0,005	0,42	.....	.....
858	1,05	1,07	0,50	0,55	0,30	0,30	0,017	0,009	.....	.....	.....
861	0,95	0,97	0,30	0,31	0,25	0,24	0,007	0,005	.....	1,20	1,11

Don't

THIS ADDITION TO THE DON'T FAMILY DEALS MOSTLY WITH THE PURCHASE OF A SECOND-HAND AUTOMOBILE, LEAVING ROOM FOR A FEW INJUNCTIONS FOR EVERY-DAY USE AND A DASH OF HORSE SENSE FOR THE MAN THAT GETS IN WRONG FIRST AND THINKS AFTERWARDS

Don't forget that in polite society a second-hand automobile is called a "used automobile."

Don't overlook the fact that it may be a very much used car at that.

Don't think that a re-built demonstrating car, so-called, is a new automobile.

Don't become confused if it is said that the car is almost new and has not gone 1,000 miles—a precipice is not 1,000 miles down—but the going is such that the automobile that negotiates it will have a couple of broken ribs.

Don't look in the eye of the man that is telling you how good a second-hand car is; look in the eye of the car and see if it has a cast in it.

Don't try out your horse trading skill; what's the use of getting stuck?

Don't listen to the wiles of the man who says the car is almost new when the finish on the body shows that it has gone through the revolutionary war.

Don't forget that it takes time and service to make a log cabin look as if the resident has an ancestry—when an automobile looks that way it may have ancestral proclivities.

Don't add to your ancestors; an historical great-grandfather is a joy forever, but an automobile, if it belongs in that class, will be as sweet running as a threshing machine.

Don't let the demonstrator try out the second-hand car that you are to put your faith and your money in under an elevated railway; the elevator may make more noise than the car.

Don't persuade yourself that a car is making all the noise that it can when the demonstrator is nursing it along the boulevard at a low speed; try it out on high speed; give it a little cobble stone going; if it rattles like a saw mill purchase it as one if you have very little wood to saw.

Don't fail to test the car out on the several gears; it may not be silent on any of the gears excepting "direct."

Don't assume that the effect of noise is merely to be measured on a basis of its effect on your nerve; if you are a boiler-maker you can stand a lot of noise; the remaining fact is that noise is a sign of depreciation; remember that signs of depreciation would indicate to a Sherlock Holmes that there is a repair bill coming down the road.

Don't make haste in reaching the conclusion that silent performance is a sure sign of quality; the car may have been enjoined to be silent.

Don't forget that the rattling joints of a car, if they are filled up with paint, will cease to rattle.

Don't overlook the practice of putting bee's wax on the gears to silence them.

Don't go by the name plate; some wag may have replaced it by a more modern one.

Don't labor under the impression that a Worth sign on a costume makes it a Worth dress; the costume may have been made on the East Side. Likewise, an automobile may be disguised.

Don't think that a second-hand car is good just because it cost a lot of money in the first place.

Don't forget, the more the car cost in the first place, the greater will be the depreciation cost in the long run; if the depreciation is 10 per cent., for illustration, this percentage of $6,000 is $600, and a like percentage of $1,000 is but $100.

Don't overlook the fact that the depreciation of an automobile will be greater if the power plant is designed for high speed than will be true if the power available is barely sufficient to propel the car at an ordinary speed—the difference is very noticeable.

Don't allow yourself to get used to the idea that the compression of the motor is all right just because it cranks hard. A supply of heavy lubricating oil, put in on purpose, would produce this effect.

Don't be deceived; if there is a compression release on the car the demonstrator may be able to conceal the fact that the compression is far from good; he will point out that the compression should be slight when the release is used, as in cranking, but this will prevent you from finding out just how bad the compression is unless you try it when the release is not working.

Don't fail to remove all the lubricating oil, and after replacing it with a normal grade, determine what the true conditions of compression are; the power of a motor, as well as the fuel economy, increases with compression.

Don't purchase an automobile that is fitted with a clutch that will not take the automobile up a 20 per cent. grade; if

the clutch will not hold, the power of the motor will be of no avail.

Don't fail to look twice at the clutch of the car if the same is "fierce." This may be a sign that the clutch is tightened up too much, just for the occasion—it might not hold in regular service.

Don't be satisfied with leaking valves; the leak may not be the sign of serious trouble; if the demonstrator says the valves can be ground in to make them tight, let him show you—the real point is, can they?

Don't invest in a car that has a cooling system that fails to maintain the normal working temperature of the cooling water. If the water boils when the car is standing at the curb, it is a sign that the cooling system is not what it should be.

Don't forget that the failure of the cooling system may be due to serious thermic derangement as well as a leaky pump.

Don't let the demonstrator convince you that cooling trouble is a slight derangement that can be remedied at the cost of a special delivery postage stamp—if he goes on that way, pay him the amount and let him do the work.

Don't permit the seller of the car to persuade you that ignition trouble is due to a set of depleted dry batteries—if he says that the ignition system will be all right as soon as the dry batteries are replaced by new ones, let him replace them and then show you how well the automobile will behave.

Don't fail to try out both ignition systems; this can be done in a very simple way: Run the car on one of the systems, and when it is performing well, throw in the other system and note the difference in performance.

Don't purchase an automobile that is not properly provided with brakes—it is your neck that is at stake.

Don't be induced to disregard the poor performance of the emergency brakes; the demonstrator may want to keep from you the information that they are faulty in design and cannot be made to work; if he says that 50 cents will re-line them and make them better than new, give him a dollar and turn him loose on the job.

Don't, just because the price sounds low, purchase an automobile that will not run; are you not aware that old iron is worth about one cent per pound?

Don't forget that an automobile is like a hound; if it cannot run it is scarcely worth feeding.

Don't fail to observe the condition of the springs; if they are in a state of "sag" it is easy to determine the fact; all that is necessary is to measure from the floor up to the underside of the chassis frame on both sides of the car; if there is a sag, one side will be down.

Don't fail to observe how much the front wheels wobble when the car is being driven along the road at a good pace; wobbling wheels are not to be tolerated; the trouble may be due to a fault in design as well as to lost motion.

Don't accept a car that has a worn-out steering gear; lost motion will tell the tale; if the demonstrator says it is but a trifle, and that it can be fixed, why beat him out of the pleasure of showing you just how clever he is?

Don't invest in a sagging live rear axle; if it can be fixed up let the seller do it. If it cannot be fixed, let the seller stew in his own juice.

Don't figure on the tires being of any value; they may be chalked up; it is possible that they were given hot water treatment before being put on; the inner tubes cannot be seen through the outer casings.

Don't fail to observe if the side-bars of the frame are in good order and free from a sag.

Don't fail to try the clutch lever when the emergency brakes are set; for all that you know, the brakes will interfere with the proper working of the clutch.

Don't reach the conclusion that all the possible troubles of the second-hand candidate are told here.

Don't be blinded by a lot of junk accessories—what you need is an automobile that will run, and in which some of the original sweet running qualities may still be discovered.

Don't be skeptical; there are good second-hand automobiles to be had—be diligent; scrutinize the entrails; if trouble is indicated, remember that you can scarcely be expected to see all of it; play safe in that event.

Don't conclude that a second-hand automobile is all right just because none of the troubles as here cited are not to be found; these are the troubles that belong in the automobile that you are not to put good money into.

Don't pay too much for a car that stands the light of a searching examination after it is found that it is free from impossible troubles—remember that it is still a second-hand car even if it does appear to be in an excellent state of preservation.

Don't monopolize the payment of tolls. Your friends may want to dig in their jeans once in a while.

Don't apply the brakes too suddenly on wet asphalt. The car is liable to go ahead anyhow if you do.

Don't try to show your car's paces on a tortuous downgrade. You may get your name in next morning's paper.

Don't try to "rush" a toll-gate. Suburban telephone companies are numerous.

Don't try to argue with a motor "cop." It only makes him worse.

Don't rely on your individual efforts in condemning bad automobile laws. Join some good club in your neighborhood and pay your dues regularly.

Don't wear your cap wrong-end foremost. It may give you a speedy appearance, but your eyes will suffer.

Don't start on a long trip without an extra pair of goggles in your kit. Eyes are too valuable to warrant taking chances with them.

Don't take both hands off the steering wheel to adjust your goggles. Telegraph poles and ditches are the automobile's affinities.

Don't pass another car at high speed. A slight miscalculation may prove costly.

Don't trail another car too closely, or you'll eat your bushel of dirt in too large portions for comfort.

Don't make up as a racing driver when you are on a pleasure tour.

Don't trust to luck to secure a rubber coat in case of rain. Take your own.

Don't delay too long in throwing in your low gear on a bad hill. You may stall your engine.

Don't try to get good results from an ignition system that is troubled with poor joints in the wiring; if the joints are soldered they will be barely good enough for their intended purpose.

Don't allow inertia of mind to stand in the way of inspecting the ignition system at frequent intervals; the wiring and connections need it.

Don't place $30 worth of tools in the tender keeping of a tonneau (under the seat) with the floor boards so loosely inserted that the tools will be scattered hither and yon along the roadside.

Don't forget that a file is the repairman's lathe, shaper, planer and milling machine. A good file is a very handy tool; all files are not good.

Don't be a pessimist when it is too late; if some gawk wants to hurrah money out of your pocket tell him to guess again.

Don't catch the enthusiasm of the fellow who has an eye on the yellow backs that persist in peeping over the gunwale of your vest pocket—why not have something to say about it; you are at least entitled to an opinion.

Don't grow weeds in your back yard and an account at a garage for car storage at the same time; put up a little garage of your own—the cost is but a trifle.

Letters

DISCUSSING MATTERS OF INTEREST TO USERS OF AUTOMOBILES; KNOCKS IN CYLINDERS; CORRECT PRACTICE IN DRIVING; DIFFERENCE BETWEEN HIGH-TENSION AND OTHER JUMP-SPARK SYSTEMS; HEATED MOTORS AND BOILING RADIATORS, ETC.

Loss of Power and Knocking on Grades

Editor THE AUTOMOBILE:

[2,361]—I have a new automobile and it seems to run very well indeed excepting when it is negotiating a long grade or when the road is soft and the pulling is unusually hard. It is a very annoying situation and I would consider myself much favored were you to give the matter a little attention. Last year when I wrote to you about other cases of trouble I had, the remedy that you gave me was to the point and it undoubtedly saved me many times the subscription price of THE AUTOMOBILE.

C. T. DEXTER.

Mobile, Ala.

There is not enough clearance between the pistons and the cylinder walls. Have the cylinders removed and rebored. The clearance should be on a basis as follows:

CLEARANCE REQUIRED BY PISTONS IN CYLINDERS

Bore of Cylinders in Inches	Clearance of Pistons	
	At Top	At Bottom
4	0.005	0.010
4 1-2	0.008	0.015
5	0.010	0.020
5 1-2	0.012	0.025
6	0.015	0.028

These allowances seem to be excessive and many autoists as well as some designers will generously disagree with the proposal. The fact remains that better results will follow if the pistons clear a little more than is to be expected when they are on the verge of sticking. It is not by having sticking pistons that compression is to be maintained. This quality follows when the rings are properly fitted.

A Few Special Situations Encountered in Driving

Editor THE AUTOMOBILE:

[2,362]—Like a good many other autoists of a relatively new vintage I know enough to keep to the right when going along the road; I also know that a road hog is not a good citizen; it is my intention to keep within the law, but I am not sure that I fully understand some of the more difficult situations that do occasionally arise. Will you please illustrate the correct practice under the conditions as follows:

1. When a car is approaching a cross street and it is desired to turn the same around.
2. When four cars come abreast; two going each way.
3. When one car is about to enter a cross street and meets another coming out.
4. When a car comes out of a street and approaches a circle, as at the Circle in New York City.

Brooklyn, N. Y.

The four specific situations are illustrated here and the captions under the illustrations will be sufficiently clear to eliminate the need of further elucidation.

High-Tension and Other Jump-Spark Systems

Editor THE AUTOMOBILE:

[2,363]—There seems to be a considerable amount of talk going the rounds about true high-tension ignition systems and other high-tension jump-spark schemes. Are they not, taking them as a whole, all high-tension jump-spark systems? If so, what are the distinctions that have to be made in properly describing them? It is believed that THE AUTOMOBILE is the one paper in the country that is capable of, and fearless enough to state the facts even though there may be some trade secrets involved. In any case why should there be any trade secrets? Is it not right that a man should know what he is getting when he pays good money for it?

GEO. W. PEABODY.

Plainfield, N. J.

Talk is cheap. When a company goes to the cost of building a device and exerts itself sufficiently to attract the notice of a clientèle, it stands to reason that it can scarcely hope to evade publicity, and knowing this, there is little chance that it will build any device that it thinks is below an acceptable standard.

Every ignition system that uses spark plugs in the cylinders, of the character that furnishes the spark by the jumping of the electrical charge across a fixed gap, is a true high-tension system.

All high-tension jump-spark systems of ignition are not made in the same way. There are two principal subdivisions, *i. e.,* (a) the system that uses high-tension magnetos as the source of electrical potential and (b) systems that employ step-up transformers in conjunction with low-tension magnetos.

The high-tension magneto system, as depicted in Fig. 5, differs from the step-up transformer system, structurally, due to the fact that the armature of the magneto has a double winding, the idea being to generate a low-tension current in the coarse wire winding, and step it up to a high potential in the fine wire winding of the armature. This plan eliminates the use of the separate step-up transformer for the reason that it is embodied into the construction of the magneto itself in this way.

In the second type of ignition equipment, the armature has a low-tension winding, and the terminals of this winding are connected up to a separate step-up transformer as shown in Fig. 6.

Both systems, according to this reasoning, have provision for generating a low-potential wave, and employ a transformer to multiply the voltage of the wave; that is to say, a secondary winding, on the principle of the transformer, is used to step the voltage up to some higher level.

The difference, in point of principle, is that in the magneto that is self-contained the coils are all on the armature, whereas the remaining type of magneto has a separate system of coils to perform the secondary function.

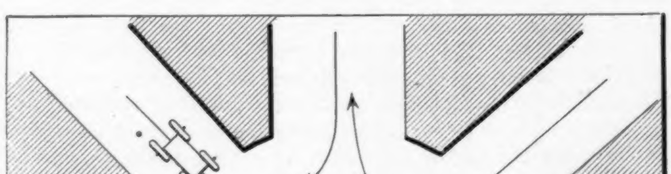


Fig. 1—Arrows point the way to an automobile that approaches a circle, coming in from any one of the converging streets or avenues

Which is the best system? Such a question is more or less foolish. The general principle is the same in both cases. One slight difference should be noted, *i.e.*, when the secondary winding is placed on the armature of the magneto, it cuts the magnetic flux and would generate the electromotive equivalent due to the number of inductors employed even were there no primary coil employed.

In the meantime it is within the realm of belief to take up with the idea that most of the troubles that are experienced with ignition systems are due to causes that are not due to any violation of magnetic principles, basically. The faults are of detail.

Motor Heats and Radiator Boils

Editor The Automobile:

[2,364]—I have a car that seemed to work very well when I purchased it and the demonstration, which was long, certainly did not disclose anything of the trouble that I am now experiencing. In a short time after I take the car out on the road the motor shows that it is heating up, and during the day I have to fill the radiator three or four times. Certainly this is not the performance that I had a right to expect from the car when I purchased it and I am much disappointed as you can readily appreciate. The agent who sold the car to me does not

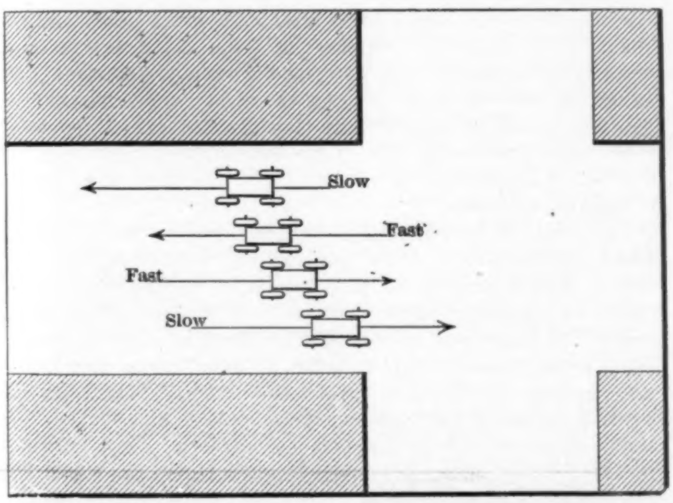


Fig. 2—Presenting four cars abreast, two traveling in each direction; indicating that the two outer cars should go slow to permit the two inner cars to get by and out of the way

seem to be very sympathetic and he as much as said to me go and learn how to drive; the trouble is in you and not in the car. Do you think this is fair treatment after taking my money?

New Subscriber.

New York City.

When the agent took your money you took his car; a fair exchange is no robbery. Sympathy, of the kind that you want, costs money. The agent's profit is probably not enough to encourage him to reduce it in the way that you would suggest. When he told you that the trouble was in you rather than in the car, strange as it may seem to you, he was telling the truth. The fact of the matter is that you persist in running the motor on a retarded spark. Advance the spark so that the motor will not heat up, and if the car does not then run slow enough to suit you, change to a lower gear. Throttle down on the mixture a little, and it will also be of advantage to you to reduce the flow of gasoline at low speed. Too much gasoline is likely to cause over-heating.

What Is a Good Practical Timing for a Motor?

Editor The Automobile:

[2,365]—Since I purchased my automobile two years ago I have gone over the timing of the opening and closing of the

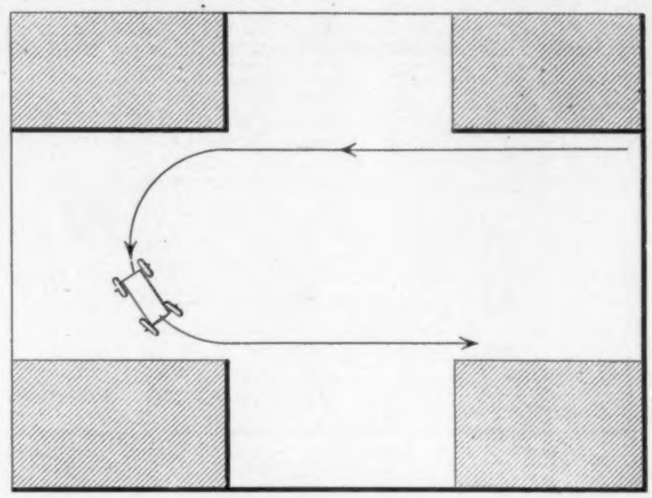


Fig. 3—When a car is going in one direction and it is to be turned around; the figure indicates that the car should go by the lateral before turning around

valves three times and I want to say that it has been a beneficial practice taking it on the whole. I did not wait until the motor showed distress; it is my belief that it is not good practice to get into trouble even without thinking of how to get out again. When I purchased my car and brought it home to my little garage, the first thing I did was to check over the timing of the valves, and I found that they were not all timed alike. I did not get vexed and go back to the agent for redress; what I did say to myself was, if the motor was not properly timed when the agent said it was in the pinkest of condition, why should I take the car back to him and risk having it put in worse shape than I found it. If the agent was that kind of a man it was enough to find it out and keep away from that grade of smallpox. Moreover, the automobile was a good one in spite of the shortcomings of the agent.

My first try at timing was not much of a success, but I made the car run better than when the agent handed it to me. What I then did was to find out how each valve was timed and I took a mean timing, that is to say, the average of the variations as I found them in the car. After that I went into the matter at some length and learned how to deftly manipulate the mechanism. With growing confidence I retimed the valves and the situation was improved quite noticeably. The motor "kicked along" for more than a year on this second timing, but the day finally came when I considered that the motor was getting short of breath, and I went at it again—the result was very good.

It occurs to me now that I may have been over-confident after

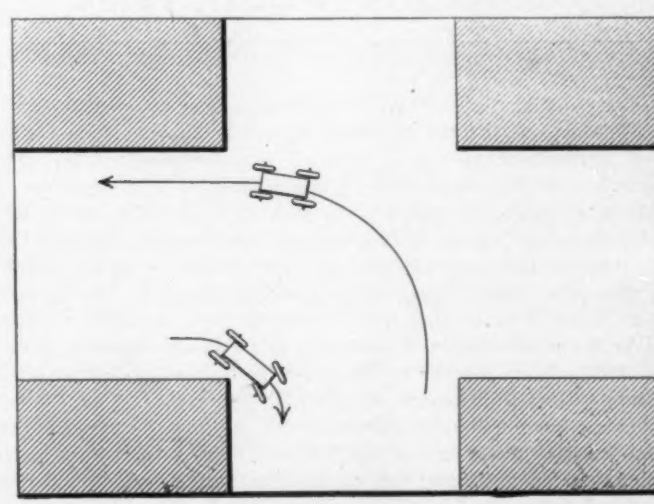


Fig. 4—A car coming out of a lateral and another going in; it is not only desirable to go slow, but it is also proper to keep well to the right of the street

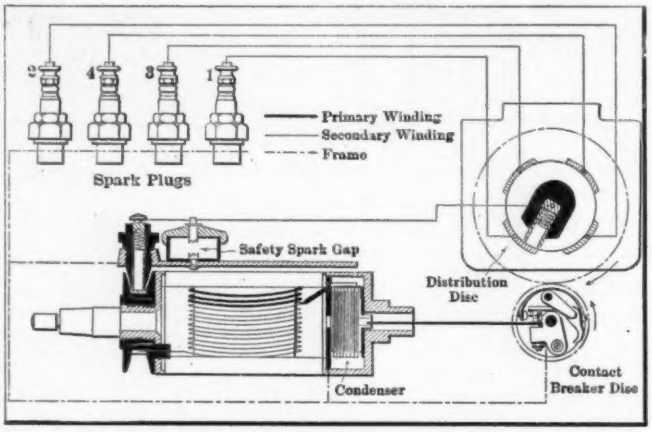


Fig. 5—High-tension jump-spark ignition system using high-tension magneto

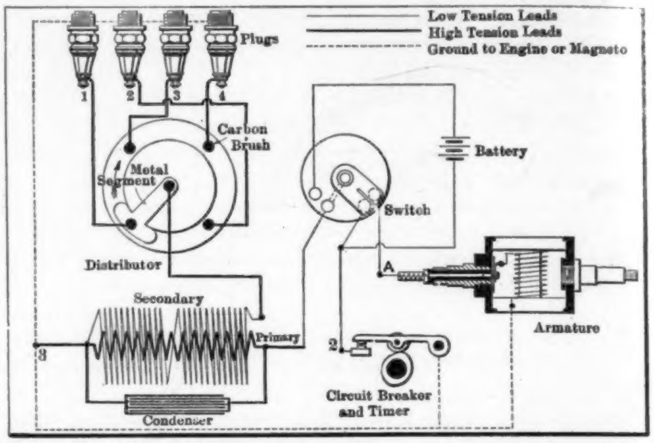


Fig. 6—High-tension jump-spark ignition system using low-tension magneto

all; perhaps there is a better timing than that which I use, at all events I will be glad to do the work if you will direct me.

ALEX. D. MANSFIELD.

Buffalo, N. Y.

So brave a motorist is hardly in need of any help at all. The probabilities are that the timing is quite up to the best requirement. The following is considered a good setting of the valves of a motor that is to perform flexibly, running at a maximum speed of 1,300 revolutions per minute:

SATISFACTORY TIMING OF VALVES CONSIDERING FLEXIBLE WORK

Lead of Exhaust Opening	Lag of Inlet Closing	Lag of Exhaust Closing	Lag of Inlet Opening
44	33	10	17

It will be understood that the figures are in terms of degrees as marked off on the flywheel of the motor.

Some motors fail to work satisfactory when the inlet is opened close to the closing of the exhaust; if the design is such that it is feasible to open the inlet earlier it will be desirable to do so.

There is quite a little in the question of timing a motor in a way to conform to its characteristics, but this is a detail that must be taken care of alongside of the fact that the motor must be used in the service for which it may be designed. If a motor is designed for one purpose and used in some other work, it may be better to so time the same that it will lean toward the intended result—the value of the service will, of course, fall short of the maximum obtainable when best conditions are satisfied.

Clutch Spinning Interferes with Sliding of Gear

Editor THE AUTOMOBILE:

[2,366]—I have just purchased a new automobile and since it is my third car I have some idea of how the gears ought to slide. What I find is that the clutch has to be slowed down before I am able to change gears and a pause is necessary. The trouble is that the pause is too great and I would like to have you tell me of the reason. The clutch is of large diameter and looks quite substantial; it is of the leather-faced cone type.

SUBSCRIBER.

Hagerstown, Md.

The clutch is of such large diameter and so heavy that the energy stored in it is more than can be disposed of in a short time. It is impossible to slide the gears before they are reduced to nearly the same speed and the flywheel effect of the clutch interferes with this demand. There is only one way to apply a remedy and that is to attach a "drag" to the clutch. This can be done by finding a surface for a small brake-shoe and figuring out a motion for manipulating the same. The drag should come on just as the clutch is released. Cork inserts in the face of the drag will make it work better than it will if the contact is metal to metal.

Questions That Arise

CONCERNING THE PROPER SIZE OF A CARBURETER IN PROPORTION TO THE AMOUNT OF WORK IT WILL BE CALLED UPON TO PERFORM—TESTING OF GNOME MOTORS

[223]—What is that fixes the ultimate size of a carbureter?

The capacity of the same for delivering gasoline to the train of atmospheric air on a basis of 8,000 volumes of air at a pressure of one atmosphere to one volume of liquid gasoline at the same pressure, assuming the design of the carbureter is such that the liquid gasoline is vaporized and mingled with the air before the same reaches the combustion chamber of the motor.

The best test to make to ascertain whether or not the carbureter is large enough for a motor in a specific instance is to take the automobile to a road that has a 20 per cent. grade that is long. Start the car up the grade at its maximum speed and slide to low gear, keeping the motor going as fast as possible and the car climbing as fast as it will go. If the carbureter is too small for the motor, the latter will drink up all the gasoline that the carbureter will supply, and, as the demand will then exceed the supply, the motor will then stall.

This is a dangerous situation and it is one that should be examined into by every autoist in order that he will be able to judge of the mountain climbing ability of his automobile before he entertains the idea of making steep ascents.

There is a secondary reason for failure of the system of carburetion on long steep grades. If the gravity principle of feed is used and the "head" is restricted, it is just possible that this head will be reduced by gradient so much that the pressure back of the flow of gasoline will fall off to zero. This idea is illustrated in Fig. 1. Obviously, the shorter the distance L the less will be the trouble from this quarter, and if the gasoline tank is directly over the carbureter the difference in the head due to gradient will be almost nothing. As the illustration shows, if the grade is such that the line designated as level changes to the position designated as grade, the head will change from the original difference, as indicated in conjunction with the level line, to zero, as indicated in conjunction with the grade line; at this instant the gasoline will cease to flow to the carbureter unless the tank is more or less full, when the difference in head will be directly proportional to the height of gasoline in the tank.

But this is a bad state of affairs; the pressure on the gasoline will then change with the quantity of gasoline in the tank, and while it might flow fast enough to afford some result on a level, it might so limit the capacity of the carbureter just when it should be a maximum that the motor would be stalled. Now, it is not dangerous, as a rule, to have the motor stall when the road is level, but when a car is going up the side of a mountain it is far from pleasant to contemplate the idea that the power will cease and the motor will back down the steep declivity unless the brakes hold. Of course the brakes will hold if they are in good working order and properly designed. But are they always in good working order? Are they invariably properly designed? How many motorists can write in to the editor and say the brakes on my car, especially the emergency system, will not stop or hold my car?

[224]—What is the prospect from motors of the type known as the Gnome? Does it offer any attraction to the maker of automobiles? If it is light and powerful it should offer possibilities.

During the official tests held at the laboratory of the Automobile Club of France the new Gnome 14-cylinder, 100-horsepower motor failed to give the results claimed for and expected of it. The motor consists of two groups of 50 horsepower each connected up to a two-throw crankshaft, the explosions of the front and rear motor taking place at 180 degrees in relation one to the other. The cylinders measure 4 3-10 by 4 7-10 inches bore and stroke, and are cooled by revolving, together with the crankcase, around the fixed shaft.

The first test lasted 28 minutes 32 seconds, being stopped by the breakage of an intake valve spring. During the first 15 minutes the motor averaged 76.1 horsepower, at a speed of 1,128 revolutions; during the remainder of the time, at 783 revolutions a minute, the average power was 25.6 horsepower. During the 28 minutes 32 seconds the motor was under test its average speed was 1,004 revolutions a minute; average power 52.97; total consumption of gasoline 5 kilos 700 (12.7 pounds); total consumption of lubricant—castor oil—4 kilos, 400 (9.6 pounds); specific consumption of gasoline per horsepower-hour, 0 kilo, 226; specific consumption of lubricant per horsepower-hour, 0 kilo, 174; weight of the motor, 304.6 pounds.

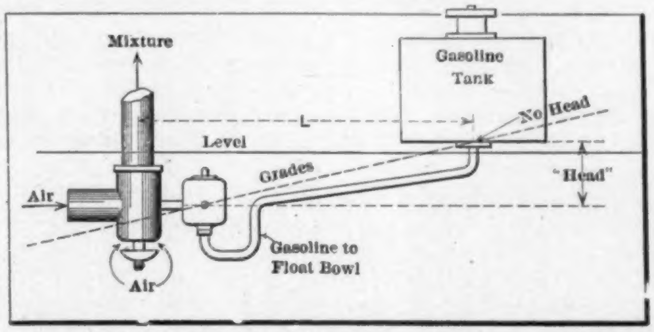


Fig. 1—Showing the influence of grades on the flow of gasoline from a tank under the influence of gravity

A second trial was stopped at the end of 59 minutes 3 seconds by reason of the breakage of two sparking plugs. On the third test the motor was stopped voluntarily and at the request of the owner at the end of one hour. The average speed and power for each 15 minutes were as follows: 1,135 revolutions, 74.40 horsepower; 1,112 revolutions, 69.90 horsepower; 1,100 revolutions, 67.78 horsepower; 1,098 revolutions, 67.58 horsepower. The average speed during the one hour's test was 1,111 revolutions a minute and the average power 69.89 horsepower. The consumption of gasoline for the hour was 22 kilos 700 (46.6 pounds); total consumption of lubricant, 11 kilos (24.2 pounds); specific consumption of gasoline per horsepower-hour, 0. k. 324 (0.71 pound); specific consumption of lubricant per horsepower-hour, 0. k. 157 (0.34 pound). The total weight of motor 304.6 pounds; weight per horsepower, 4.5 pounds. The tests were made on the first motor of this type produced at the factory. In their own works 95 horsepower had been obtained.

The only other competitor in the same category was a revolving 2-cylinder air-cooled Farcot motor which stopped dead at the end of a few minutes by reason of the seizing of an aluminum piston.

Digest

EXTRACTS ON TECHNICAL LINES FROM FIFTY BEST FOREIGN PAPERS—THE INFLUENCE OF A SECOND DIRECT DRIVE TO MAKE THE OPERATION OF A VEHICLE CONVENIENT AND ECONOMICAL IN HILLY DISTRICTS—AN EXPLANATION OF THE VAGARIES OF CARBURETERS

The transmission with two direct drives gives different results.* Let the gear speed ratios be supposed to be as before. Vehicle B can then scale the 5 per cent. hill on the third speed at about 36 kilometers per hour, which means a gain in speed of 8 kilometers and a smaller fuel consumption.

If instead of four gear speeds only three are available and their ratios are: first to second as 0.50 to 1 and second to third as 0.57 to 1, vehicle B is still more at a disadvantage; it can climb the 5 per cent. grade only on the low speed at 16 kil. per hour.

As has been seen, vehicle A could climb a 7 per cent. hill without changing gear, but rather slowly, at 28 kilometers per hour, but the 5 per cent. hill it climbs at 38 kilometers, the 6 per cent. at 42 kilometers. Evidently there is no advantage in changing gear for the 5 per cent. hill. In fact, if there is only one direct drive, the motor on reduced gear would develop only 14 horsepower at the rim, while, going at 58 kilometers per hour and direct drive, the power at the rim is 17 horsepower, so that there would be a loss in changing gear. The situation is similar for the 6 per cent. hill; it can not be scaled faster than 42 kilometers per hour, whatever we do, unless there is a second direct drive to save the efficiency of the transmission. The 7 per cent. hill can be climbed on the third at 35 kilometers, which is a gain of 7 kilometers per hour. With a second direct drive, the 5 per cent. hill could be scaled at 61 kilometers, which would be a small gain, hardly compensating for the manipulation of the lever, but the 6 per cent. hill may be taken on the third speed and direct drive at 56 kilometers, which is a gain of 14 kilometers over the third speed, by interposed reducing gear, and the 7 per cent. hill can be scaled at almost 50 kilometers by direct third-speed drive, which is a gain of over 20 kilometers compared with the direct high speed and of 15 kilometers compared with third speed by reducing gear.

While it is understood that, on level roads, the comfort of operating a car with few gear changes depends mainly upon the flexibility of the motor, the examples presented show that in traveling over a hilly territory the comfort in operation is nearly independent of the flexibility of the motor; that is, the motor may be highly flexible and the vehicle may, nevertheless, exact many manipulations of the speed lever, or the motor may be lacking in flexibility and the vehicle yet very comfortable to operate. The runabout or the torpedo type will always be more agreeable to conduct for this reason than a heavy limousine (of equal power) and, while the lighter and less bulky vehicles may get along even in moderately hilly districts, such as Normandy or Touraine, with three speeds and a single direct drive, the limousine placed on a chassis of equal power demands four speeds, and the two highest with direct drive, in order to make

* Continued from last week.

the vehicle more rapid, easier to operate and less wasteful of fuel. The builders in the Lyon district, which is especially mountainous, have long ago come to the double direct drive. Cottin-Desgouttes, Pilain, La Buire and Berliet have two direct drives. Pipe also constructs his transmission box with two direct drives.—C. Faroux in *La Vie Automobile,* June 4.

All automobilists have observed that carbureters work differently according to the season, the condition of the atmosphere and, on the same day, according to the hour and the temperature. In passing through a forest, even those least alert discover that the vehicle becomes imbued with a responsiveness which it did not possess a moment before. The author has taken pains to seize these differences by accurate and prolonged observation in practice. For one year almost daily he passed through 15 kilometers of forest. Often, he says, during the heat of Summer, the vehicle would run sluggishly or even badly, over an overheated road, toward one o'clock in the afternoon, but as soon as the forest was reached the motor picked up and the gait was quickened, without the carbureter being touched. Also, morning, evening and night gave better motor results than the heated hours of the day on any road.

At the aviation meet at Vichy, last July, on an apparently perfect day, large masses of spectators waited in vain from ten o'clock in the morning to 7:30 at night, and became quite violent and abusive, seeing no reason why flights should not be made. But in reality the carbureters could not be made to work properly on any of the machines, as the day was tropically hot and the territory denuded of all trees. But after sundown the aviators took out their machines and made the evolutions expected of them. Two explanations have been offered for the peculiarities mentioned. One ascribes them to the chlorophyllian vapors of forests, but must be rejected, since it does not explain the morning and evening effects where no trees are present. The other explains them by the variations in humidity which follow variations in temperature, and seems plausible for the Summer, but conflicts with the facts noted in Winter. As soon as the coefficient of humidity becomes pronounced in Winter, as it easily does because very little water vapor is required to saturate cold air, the carburation becomes less good. And it seems unreasonable that water vapor should be beneficial in Summer and harmful in Winter.

Some of the facts of combustion in cylinders throws light on the subject. To burn gasoline completely there is required at least 15 times its weight in air. Tho quantity of air used greatly influences the heat of the combustion. According to Claudel, the theoretically best mixture gives 2,788° centigrade. With one and one-half times more air the heat drops to 1,951°; with twice as much air to 1,488,° and to 1,010° with three times as much air. The thermic efficiency will then, other things equal, be more perfect the more nearly the air is supplied in the proportion of 15 to 1, weight units. Any variation in the proportion must be of importance. The carbureter is the instrument by which the proportion is regulated. In principle it maintains the fuel at a constant level by means of a float and delivers the gasoline at a jet whose mouth is slightly above the level of the liquid. With the customary means for regulating the auxiliary air admission, the carbureter should maintain a constant mixture, but all who have used carbureters whose auxiliary air intake is controlled by a special finger-lever know that it is often necessary to operate this lever without any cause for so doing being apparent. The physical condition of the surrounding atmosphere seems to influence carburation, and as the variations are particularly noticeable in the Summer between the hot and the cool hours there is reason for inquiring how the atmosphere behaves during these periods. First, the hygrometric state is variable. In general the air contains more water vapor in summer than in Winter and is nevertheless less humid because it will hold more before saturated. Humidity depends not on the quantity of vapor, but on its condition. In the Summer the cool mornings and evenings have less vapor, but more humidity than the hot hours, and this has given color to the hygrometric theory, which nevertheless must be rejected because humid air under other circumstances carburates poorly, and because a theory which fits better is available. In our climate the air is seldom saturated with water vapor except during fogs and thaw. It contains on an average one-half of the vapor necessary for saturation. On this basis the most favorable hygrometric condition, for a summer evening, should correspond to a temperature of 20° centigrade, with about 7 grammes of water vapor for each cubic meter of air, which is in the proportion of 1 to 170.

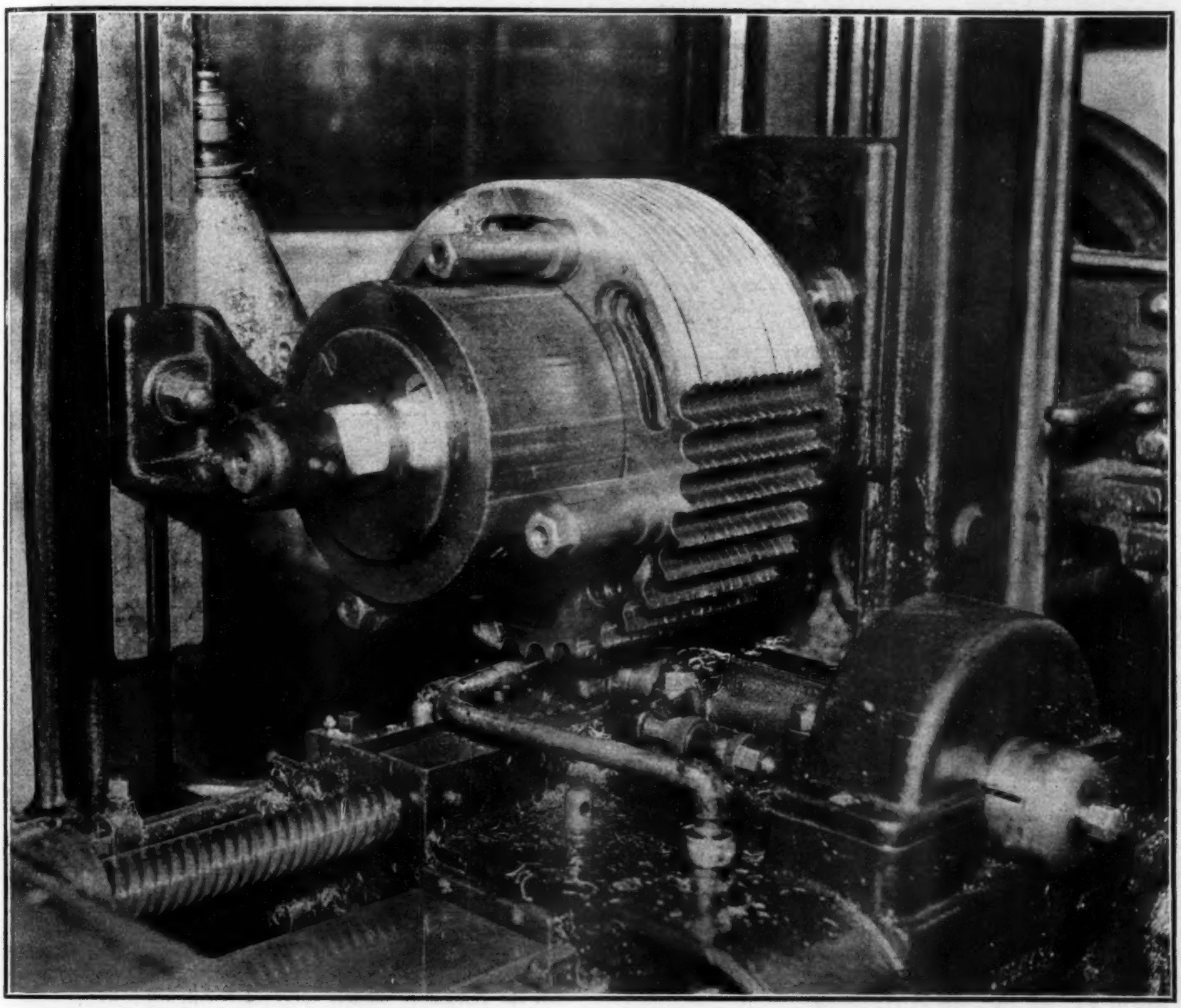
On the other hand the barometric pressure also varies, according to the hours and inversely with the temperature. The Summer air is less dense at noon than at night or in the evening, as a rule, by reason of the heat of the sun, which gives rise to expansions and thereafter to contractions, and consequently to changes in density. The influence of density must be real, because it has been verified in the case of gas motors. These industrial engines give 10 per cent. less power at an altitude of 1,000 meters than at the level of the sea. The daily variations of the barometer, being within much narrower limits, would not at this rate alone account for the variations in motor power, but in conjunction with certain other facts they form the basis of a provisional theory which the author has tried to verify by experience.

The volatile liquids used as carburants produce vapors whose tension grows in a geometric progression with the temperature. If the tension of the vapor is equal to a column of mercury 100 millimeters high, at the freezing point of water, it exceeds 3,000 millimeters at a temperature of 100°. Further, the volatility of gasoline is extremely sensitive and is affected by very slight disturbing factors. Evidently, the gravitation of the surrounding air must have a positive effect in deciding the depression of the gasoline in the jet of the carbureter, and, in turn, the smallest variation of the depression affects notably the quantity of liquid drawn out and vaporized. And, since the tension of the vapor is so much higher in warm weather, the effects are so much more noticeable in summer. Assuming a well-conceived carbureter functioning properly under any barometric pressure, when this pressure diminishes even slightly the gasoline will come out more abundantly, the best proportions of the mixture will be changed by an excess of gasoline and reduction of the air, and there will be a less efficient motor action. Finding no means for acting upon the emission of gasoline or upon the physical condition of the surrounding atmosphere, the author relates how he chose to act upon the nature of the fuel by reducing its sensitiveness and the tension of its vapors. In this he was guided by two laws: (1) when a liquid holds any foreign substance in solution the tension of its vapors is smaller than in a state of purity and so much smaller as the solution is more concentrated (nearer saturation); and, (2) when the dissolved substance is itself volatile the tension of the mixed vapors which are produced is less than the sum of their respective tensions. He relates the difficulties experienced in finding suitable substances for admixture, and cites the practical results obtained with various cars after finally deciding in favor of a substance which he calls Robur, but the composition of which he does not divulge, because it represents the commercial result of his research.—G. Patrouilleau in *La Technique Automobile et Aérienne,* August 15.

A varnish which keeps metals highly reflective and which applied to the parabolic surfaces of projectors at lighthouses or in automobile lamps saves both work and efficiency, has been produced and marketed under the name of "Camt." It is obtained by dissolving a gelatinous lacquer at high temperature in amylacetic ether with the addition of a siccative, and becomes very hard and quite impervious to water. It is applied cold without any preparation and dries in a few hours, forming an exceedingly thin and absolutely invisible film through which the metal shines with all the polish that has been imparted to it. While this new varnish may be washed with impunity it will not stand much rubbing, and is therefore of no great value for metallic automobile parts which are constantly subject to handling.—*Omnia,* July 30.

Among the Makers

CARS SHOULD BE MADE ON A DUPLICATING BASIS TO INSURE REASONABLE REPAIR COSTS—STODDARD-DAYTON LINE FOR 1911—THE HAZARD MOTOR



Depicting cutting of teeth of gang of sprocket wheels in Woods plant, using automatic gear cutter

EVERY experienced autoist realizes that it is of great advantage to have a car that is made on a duplicating basis in order that repairing may be done at a reasonable cost and on a basis that will maintain the car up to the original standard.

Quality, as it resides in an automobile, must be measured from two points of view: If the original automobile is thoroughly good, but repair parts cannot be had, the purchaser will be in a worse predicament than if a cheap and relatively poor automobile is purchased, due to the fact that the good automobile, assuming that it is high-priced also, will have an enormous cost per car mile in service. If repair parts are readily obtained and the purchase price of them is reasonable, the purchaser is then placed in a position to speculate to the extent that he will have to determine for himself whether or not a very high-priced car will be the best in the long run, or to what extent the purchase price can be shaded, remembering that repair parts can be procured when wanted, and at a price that is attractive.

The real problem is to be able to make automobiles, sewing machines, battleships, or any other character of a machine on a duplicating basis. Come to think of it, Nature did not set a good example in this regard. It is quite well understood that in Nature there are few duplicates; it might be said there is a marked and striking difference between blades of grass, babies, mountains, bandits, and even machinists—Nature goes in for variety.

The obstacle to duplication lies in the enormous cost of making preparation for duplicating parts. The cost of

gigs for a single model of a car is not far from $50,000; under most exacting conditions, even double this sum.

It must be remembered that this cost would be the same no matter how many cars of the same model might be turned out; it would be $50,000 for one automobile and it would be the same amount for any greater number.

Some relief has been realized by ganging the work; in other words, special tools are made for the purpose of doing a single operation on a large number of parts instead of upon one part. In some instances the tools are so made that they perform several consecutive operations upon a considerable number of parts at a single setting.

Accuracy, as it is induced by the use of special tools, is foreshadowed in the tool room; the most skilled artisans are there employed and they are directed by the best talent that a diligent search can uncover.

Stoddard-Dayton for 1911

A FEW CHANGES AND MANY REFINEMENTS MARK THE LINE FOR THE COMING YEAR—26 MODELS OF PLEASURE CARS AND 3 OF COMMERCIALS

FEW American makers of automobiles offer their clientèle such a wide range of choice in models, styles and prices as does the Dayton Motor Car Company, of Dayton, Ohio, in announcing its 1911 line. No less than 26 separate and distinct body models of pleasure cars, of four different sizes of power plant mounted on six chassis, are listed, not to mention three commercial cars. The pleasure cars are divided into four classes, as follows: Stoddard-Dayton "50," ten models; Stoddard-Dayton "40," seven models; Stoddard "30," six models, and Stoddard "20," three models.

In the closed-car section the company's line is particularly strong, there being two styles of limousines in the "50" class (one with fore-doors) and a beautiful landaulet. In the "30's" there is a limousine, a landaulet and a coupé. All these closed models are, as usual, most excellent examples of the body-maker's art, finished within and without with an elegance and an attention to detail in the little niceties and conveniences of furnishing that stamp them as the best specimens extant of American workmanship along those lines. Auxiliary seats are part of the equipment of all closed-body cars, and when not needed they fold completely out of the way. Closed cars are furnished in any combination of colors desired and upholstered to suit the individual taste of the purchaser in broadcloth, leather or Bedford cord.

Among the changes noticed in the 1911 models is the increase of the length of the wheelbase of the "50" chassis from 128 to 130 inches; that of the "40" from 116 to 120 inches, and of the "30" from 108 to 114 inches.

The limousines, landaulet and touring car in the "S-D 50" class have seating accommodations for seven passengers each, as have the limousine and landaulet in the "S-30" division. The "50" Torpedo and 11-K, the "40" touring cars and 11-C, the "30" touring cars and the "20" touring car carry five passengers each.

SPECIFICATIONS FOR STODDARD-

MODELS	Price	H.P., A.L.A.M.	BODY		MOTOR				COOLING		IGNITION		Lubrication
			Type	Seats	Cyl.	Bore	Stroke	Cyl. Cast	Radiator	Pump	Magneto	Battery	
"50" 11-F	$4000	40	Limous.	7	4	5	5½	Pairs	Tubular	Cent'fl	Bosch D4	Storage	Pump
"50" 11-F	4200	40	F.d. Lm	7	4	5	5½	Pairs	Tubular	Cent'fl	Barch D4	Storage	Pump
"50" 11-F	4000	40	Land't	7	4	5	5½	Pairs	Tubular	Cent'fl	Borch D4	Storage	Pump
"50" 11-F	3000	40	Tour'g*	5	4	5	5½	Pairs	Tubular	Cent'fl	Bosch D4	Storage	Pump
"50" 11-K	3000	40	Torp'o	5	4	5	5½	Pairs	Tubular	Cent'fl	Bosch D4	Storage	Pump
"50" 11-K	2925	40	S. T'do.	2	4	5	5½	Pairs	Tubular	Cent'fl	Bosch D4	Storage	Pump
"50" 11-K	2900	40	Tg. R'tr	5	4	5	5½	Pairs	Tubular	Cent.fl	Bosch D4	Storage	Pump
"50" 11-K	2900	40	B. Ton.	4	4	5	5½	Pairs	Tubular	Cent'fl	Bosch D4	Storage	Pump
"50" 11-K	2850	40	R'ster	3	4	5	5½	Pairs	Tubular	Cent'fl	Bosch D4	Storage	Pump
"50" 11-S	2800	40	Sp'str	2	4	5	5½	Pairs	Tubular	Cent'fl	Bosch D4	Storage	Pump
"40" 11-A	2300	36.1	Tour'g	5	4	4¾	5	Pairs	Tubular	Cent'fl	Bosch D4	Storage	Pump
"40" 11-A	2400	36.1	F.d.Tg.	5	4	4¾	5	Pairs	Tubular	Cent'fl	Bosch D4	Storage	Pump
"40" 11-C	2300	36.1	Tg. Rtr.	5	4	4¾	5	Pairs	Tubular	Cent'fl	Bosch D4	Storage	Pump
"40" 11-C	2300	36.1	B. Ton.	4	4	4¾	5	Pairs	Tubular	Cent'fl	Bosch D4	Storage	Pump
"40" 11-C	2350	36.1	Torp'o	4	4	4¾	5	Pairs	Tubular	Cent'fl	Bosch D4	Storage	Pump
"40" 11-C	2275	36.1	S. Ton.	2	4	4¾	5	Pairs	Tubular	Cent'fl	Bosch D4	Storage	Pump
"40" 11-C	2200	36.1	R'ster	2	4	4¾	5	Pairs	Tubular	Cent'fl	Bosch D4	Storage	Pump
"30" 11-T	2700	27.2	Limous.	7	4	4⅛	5¼	Pairs	Tubular	Cent'fl	Bosch D4	Storage	Pump
"30" 11-T	2700	27.2	Land't	7	4	4⅛	5¼	Pairs	Tubular	Cent'fl	Bosch D4	Storage	Pump
"30" 11-T	2350	27.2	Coupe	4	4	4⅛	5¼	Pairs	Tubular	Cent'fl	Bosch D4	Storage	Pump
"30" 11-B	1700	27.2	Tour'g	5	4	4⅛	5¼	Pairs	Tubular	Cent'fl	Bosch D4	Storage	Pump
"30" 11-B	1750	27.2	F.d. Tg.	5	4	4⅛	5¼	Pairs	Tubular	Cent'fl	Bosch D4	Storage	Pump
"30" 11-H	1550	27.2	R'ster	2	4	4⅛	5¼	Pairs	Tubular	Cent'fl	Bosch D4	Storage	Pump
"20" 11-R-1	1175	25.6	R'ster	2	4	4	4½	Block	Tubular	Cent'fl	Bosch D4	Storage	Pump
"20" 11-L-4	1250	25.6	Tg. R't.	4	4	4	4½	Block	Tubular	Cent'fl	Bosch D4	Storage	Pump
"20" 11-M	1275	25.6	Tour'g	5	4	4	4½	Block	Tubular	Cent'fl	Bosch D4	Storage	Pump
2 1-2 ton	3000	27.2	Truck	..	4	4⅛	5¼	Pairs	Tubular	Cent'fl	Bosch D4	Storage	Pump
1 ton	1750	25.6	Truck	..	4	4	4½	Block	Tubular	Cent'fl	Bosch D4	Storage	Pump
Delivery	1350	25.6	Wagon	..	4	4	4½	Block	Tubular	Cent'fl	Bosch D4	Storage	Pump

*Two or four doors.

The "50" 11-K, the "40" 11-C and Torpedo, the "30" Coupé and the "20" Touring-Roadster each has accommodations for four. All the remaining models carry two with the exception of the "50" Roadster, which has seats for three.

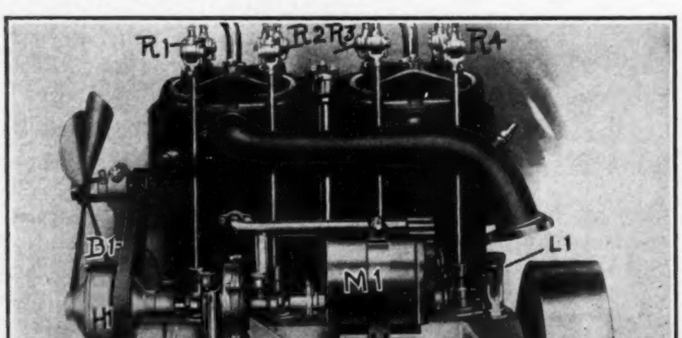


Fig. 1—"Stoddard-Dayton" motor, magneto side

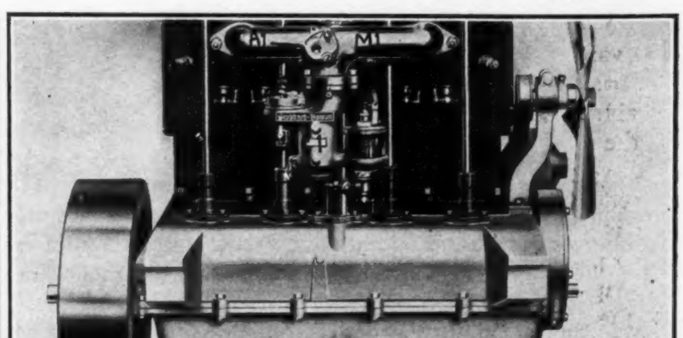


Fig. 2—"Stoddard-Dayton" motor, intake side

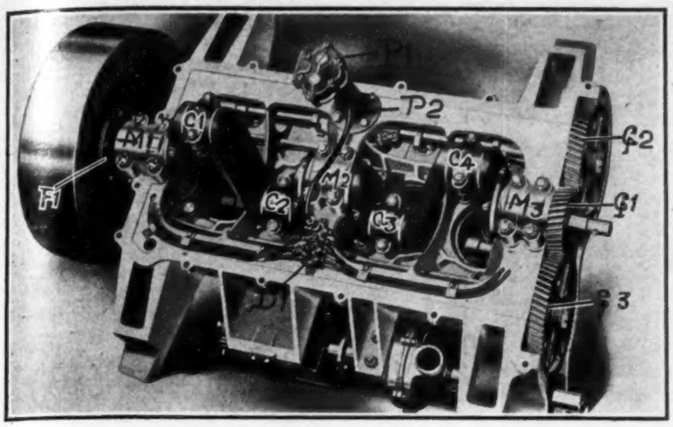


Fig. 3—"Stoddard-Dayton" 1911 construction, showing underside of the motor

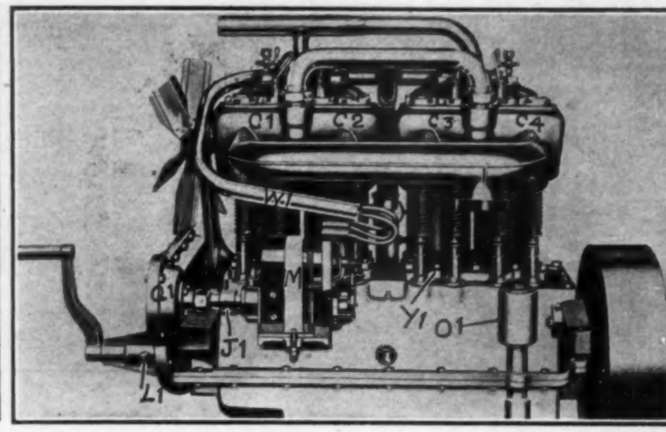


Fig. 4—Motor in the "Stoddard-30" models, showing magneto side of same

Reckoned by the A. L. A. M. formula, the motor of the Stoddard-Dayton "50" develops 40 horsepower; that of the "40," 36.1; the Stoddard "30," 27.2, and the "20," 25.6. The 2½-ton truck has a 27.2 horsepower motor and the 1-ton and the delivery wagon each 25.6. The three commercial models are chain-driven.

DAYTON CARS AS OFFERED FOR 1911

Clutch	TRANSMISSION Type	Speeds	Location	Drive	Wheelbase	Tread	Frame	BEARINGS Crank-shaft	Trans-mis'n	Axle	Weight	TIRES Front	Rear
Cone....	Selecti'e.	3	Frame.	Shaft...	130	56	P. Steel.	3 Plain	Roller...	Roller...	......	36x5	36x5
Cone....	Selecti'e.	3	Frame.	Shaft...	130	56	P. Steel..	3 Plain.	Roller...	Roller...	......	36x5	36x5
Cone....	Selecti'e.	3	Frame.	Shaft...	130	56	P. Steel..	3 Plain.	Roller...	Roller...	......	36x5	36x5
Cone....	Selecti'e.	3	Frame.	Shaft...	130	56	P. Steel..	3 Plain.	Roller...	Roller...	......	36x4½	36x4½
Cone....	Selecti'e.	3	Frame.	Shaft...	130	56	P. Steel..	3 Plain.	Roller...	Roller...	......	36x4½	36x4½
Cone....	Selecti'e.	3	Frame.	Shaft...	120	56	P. Steel..	3 Plain.	Roller...	Roller...	......	36x4½	36x4½
Cone....	Selecti'e.	3	Frame.	Shaft...	120	56	P. Steel..	3 Plain.	Roller...	Roller...	......	36x4½	36x4½
Cone....	Selecti'e.	3	Frame.	Shaft...	120	56	P. Steel..	3 Plain.	Roller...	Roller...	......	36x4½	36x4½
Cone....	Selecti'e.	3	Frame.	Shaft...	120	56	P. Steel..	3 Plain.	Roller...	Roller...	......	36x4½	36x4½
Cone....	Selecti'e.	3	Frame.	Shaft...	106	56	P. Steel..	3 Plain.	Roller...	Roller...	......	36x4	36x4
Cone....	Selecti'e.	3	Frame.	Shaft...	120	56	P. Steel..	3 Plain.	Roller...	Roller...	......	36x4	36x4
Cone....	Selecti'e.	3	Frame.	Shaft...	120	56	P. Steel..	3 Plain.	Roller...	Roller...	......	36x4	36x4
Cone....	Selecti'e.	3	Frame.	Shaft...	120	56	P. Steel..	3 Plain.	Roller...	Roller...	......	36x4	36x4
Cone....	Selecti'e.	3	Frame.	Shaft...	120	56	P. Steel..	3 Plain.	Roller...	Roller...	......	36x4	36x4
Cone....	Selecti'e.	3	Frame.	Shaft...	120	56	P. Steel..	3 Plain.	Roller...	Roller...	......	36x4	36x4
Cone....	Selecti'e.	3	Frame.	Shaft...	120	56	P. Steel..	3 Plain.	Roller...	Roller...	......	36x4	36x4
Cone....	Selecti'e.	3	Frame.	Shaft...	120	56	P. Steel..	3 Plain.	Roller...	Roller...	......	36x4	36x4
Cone....	Selecti'e.	3	Frame.	Shaft...	114	56	P. Steel..	3 Plain.	Roller...	Roller...	......	36x4	36x4
Cone....	Selecti'e.	3	Frame.	Shaft...	114	56	P. Steel..	3 Plain.	Roller...	Roller...	......	36x4	36x4
Cone....	Selecti'e.	3	Frame.	Shaft...	114	56	P. Steel..	3 Plain.	Roller...	Roller...	......	34x4	34x4
Cone....	Selecti'e.	3	Frame.	Shaft...	114	56	P. Steel..	3 Plain.	Roller...	Roller...	......	34x4	34x4
Cone....	Selecti'e.	3	Frame.	Shaft...	114	56	P. Steel..	3 Plain.	Roller...	Roller...	......	34x4	34x4
Cone....	Selecti'e.	3	Frame.	Shaft...	114	56	P. Steel..	3 Plain.	Roller...	Roller...	......	34x3½	34x3½
Cone....	Selecti'e.	3	Frame..	Shaft....	112	56	P. Steel..	3 Plain.	Roller...	Roller...	......	32x3½	32x3½
Cone....	Selecti'e.	3	Frame.	Shaft...	112	56	P. Steel..	3 Plain.	Roller...	Roller...	......	32x3½	32x3½
Cone....	Selecti'e.	3	Frame.	Shaft...	112	56	P. Steel..	3 Plain.	Roller...	Roller...	......	32x3½	32x3½
Cone....	Selecti'e.	3	Frame.	Chain..	112	56	P. Steel..	3 Plain.	Roller...	Roller...	......	34x4†	34x4†
Cone....	Selecti'e.	3	Frame.	Chain..	100	56	P. Steel..	3 Plain.	Roller...	Roller...	......	32x4	32x4
Cone....	Selecti'e.	3	Frame.	Chain..	112	56	P. Steel..	3 Plain.	Roller...	Roller...	......	33x4	33x4

†Or dual 34x3½.

Thirty-six inch wheels are standard on all the "50" and "40" models, 34-inch on the "30's" and the 32-inch on the "20's." As to tires, 36 x 5 is listed for the "50" Limousines and Landaulet, 36 x 4½ for the remainder in that class with the exception of the Speedster, which is equipped with 36 x 4—the standard equipment also of the "40" models. All of the "30" class have 34 x 4 tires but the Roadster, which is fitted with 34 x 3½. The "20" equipment is 32 x 3½ throughout. The big truck has 34 x 4 front and dual 34 x 3½ rear. The 1-ton truck 32 x 4 and the delivery wagon 33 x 4.

With no less than 29 models listed for 1911 the Stoddard-Dayton output would seem to be one of the most comprehensive and all-embracing of any of the more prominent American factories. There are four separate chassis designs—Stoddard-Dayton "50" and "40," Stoddard "30" and "20"—besides the commercial models. The "50" class includes the Limousines (the usual style, besides one with four doors). Landaulet, Touring Car (two- or four-door) and Torpedo—all with 130-inch wheelbase; Semi-Torpedo, five-passenger, four-passenger and Roadster—all with 120-inch wheelbase; and the Speedster, with 106-inch wheelbase. Included among the "40's" are two Touring models (one with doors front and rear), five-passenger, four-passenger, Torpedo, Semi-Torpedo and Roadster—all with a wheelbase of 120 inches. The Stoddard "30" class is made up of Limousine, Landaulet, Coupé, two Touring Cars (one with doors front and rear) and a Roadster—all 120-inch wheelbase. The trio of "20's" is made up of Roadster, Touring-Roadster and Touring Car—all 112-inch wheelbase. In the commercial division the 2 1-2-ton truck and the delivery wagon are mounted upon 112-inch wheelbase chassis, while the 1-ton truck has a wheelbase of 100 inches. The tread of all the models is uniformly 56 inches.

The French type of rear wheels are used on the "50's" and "40's," both of which, with the "30" models, are equipped with Universal S. D. demountable rims, with an extra rim.

The spring equipment is semi-elliptic front and three-quarter elliptic rear, being much heavier than the 1910 practice, and with less arch in the design. Shock absorbers are standard on all "50" models. In the matter of equipment, robe rail, foot rest, five lamps, Prest-O-Lite tank, horn, jack, tools, etc., are standard, with dome lights, speaking tubes and similar conveniences on the limousines in the various models. Folding rear seats are fitted in some of the Roadster designs at a small extra price.

Some Details from a Mechanical Point of View

The four 1911 power plants range from the 4 x 4 1-2 inches bore and stroke, which is used in the "20's" and the delivery wagon, and is rated by the company at 25.6 horsepower, to the 50-horsepower motor, which is 5 x 5 1-2 inches bore and stroke. The small motor is of the *bloc* type and is especially designed to serve in freight automobile work, it being used in a 1-ton truck as well as in delivery work. The next size of motor is 4 1-8 x 5 1-4-inch bore and stroke, respectively, and is used in the 2 1-2-ton truck, as well as in passenger automobiles. This motor is rated 27.2 horsepower, and serves in the Model 30, representing a complete line of cars as limousine, landau, coupé, touring car, fore-door car, and roadster. The other motors are 4 3-4 x 5 inches and 5 x 5 1-2 inches bore and stroke—Models "40" and "50" respectively.

The scheme of design of two of the types of motors is shown in the illustrations Figs. 1, 2, 3, and 4, excepting the *bloc* type of motor, which is not illustrated. Remembering that past practice in the Stoddard-Dayton plant was along lines involving overhead valve construction, it remains to be seen that for 1911 the clientèle of the company may take its choice. The overhead construction is retained, as shown in Figs. 1 and 2, but the direct-lift construction is added, as shown in Fig. 4.

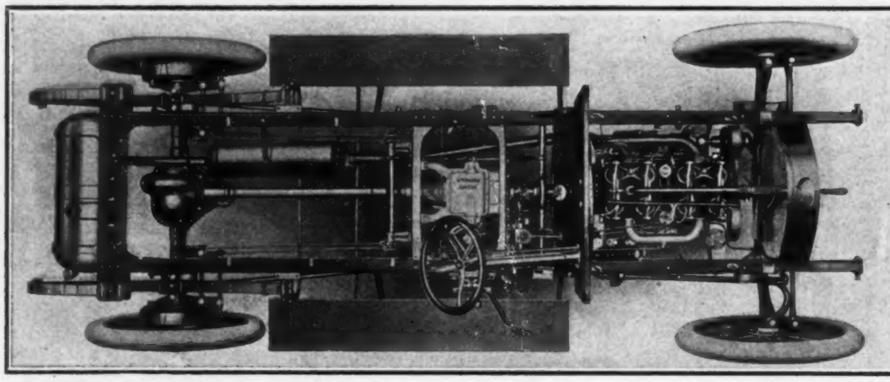


Fig. 5—Chassis of the 1911 "Stoddard-Dayton 40"

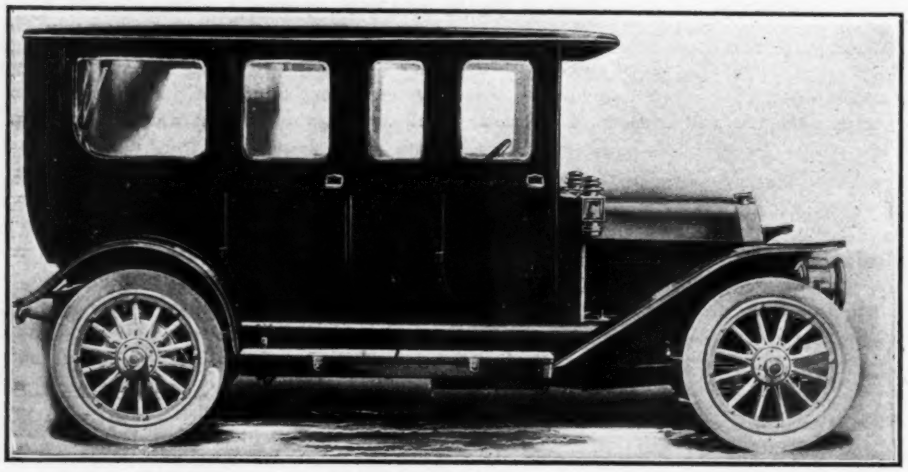


Fig. 6—"Stoddard-Dayton 50" 11-F limousine for seven passengers

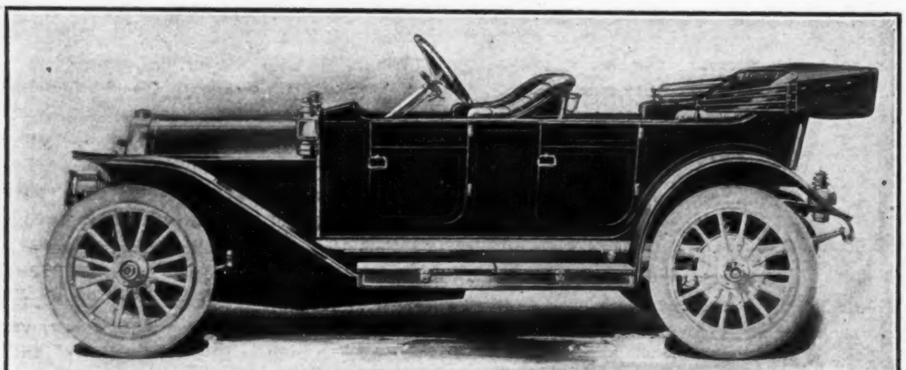


Fig. 7—"Stoddard-Dayton 40" 11-A fore-door touring car for five passengers

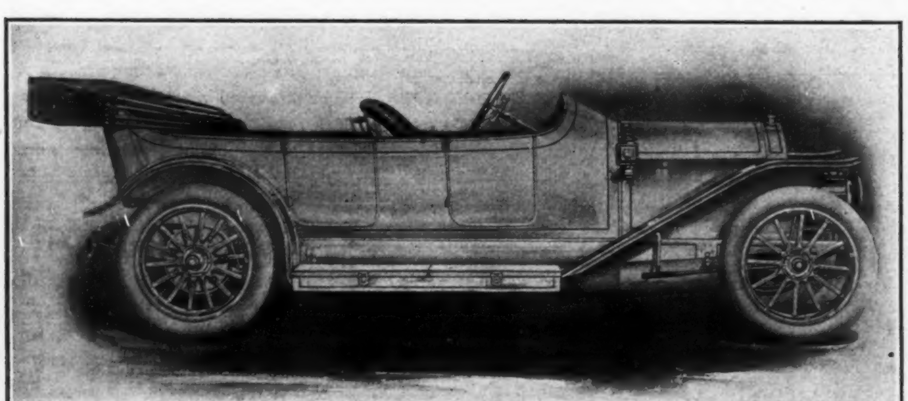


Fig. 8—"Stoddard-Dayton 50" 11-K torpedo for four passengers

As a further indication of a standardized practice, lubrication is worked out to the same completeness in each of the types of motors, using a pump for circulation. Likewise, the cone type of clutch is used in all the models, and the transmission gear is selective and three-speed in all the models, located on the frame in each case, and shaft-drive prevails throughout, excepting in the commercials, which have a side-chain drive. The tread is 56 inches in every case, and the side bars of the chassis frame are pressed steel of the channel section, excepting in the 2 1-2-ton truck. The wheelbase is long in all the models, being 112 inches in the delivery wagon, 100 inches in the 1-ton truck; the shortest wheelbase in the passenger automobile class is 112 inches in Model 20, 11-M, and the longest wheelbase is 130 inches, which obtains in five designs of the Model 50 cars.

The bearing situation is carried out along uniform lines with three plain bearings on the crankshaft in every case, and roller bearings in the transmissions and axles in all the models. It is a notable fact that the tires used on the wheels are selected with a discriminating eye, and with the understanding that but one extra casing will have to be provided in service, since but one size of tire is used in common for the front and rear wheels, and this perfectly uniform situation obtains in all the models.

The left-hand side of the motor is depicted in Fig. 1 with the magneto M1 located on a shelf that is cast integral with the upper half of the crankcase. The water pump P1 is driven from the same shaft, with a silent Oldham type of universal joint J1 between the pump and the gear on the end of the shaft, the latter meshing with the half-time gear in the housing H1. The fan in front is of good design and is driven by means of a belt B1, which is wide and is guided on the large pulley which is placed on the same shaft that furnishes rotation and power to the pump and magneto. The overhead valves show very clearly in this view, the rocker arms R1, R2, R3 and R4 being above and the push rods pass down clearing the cylinders by a proper margin and pass into the crankcase through proper guides to the point of engagement of the camshaft.

The right-hand side of the motor, as shown in Fig. 2, presents the contour of the motor case and the Stromberg carbureter C1, the same being of the multiple-jet type, with glass float bowl, and is flanged to a suitably designed manifold M1, to which is added a shutter A1 for use in adjusting the admixture of atmospheric air as the occasion demands; this shutter is adjusted once for all when the motor is being tuned up.

Fig. 3 shows the motor turned up and the lower half of the crankcase removed. The method of lubrication is clearly de-

picted here; the pump P1 is fastened to the upper half, and the main supply of lubricating oil passes from the pump through the pipe P2, thence to the distributor D1 and from there to the separate pipes that lead to the bearings to be lubricated. The main bearings M1, M2 and M3 are of large projected area, scraped in, and the nuts that are screwed up on the studs are castellated and a cotter pin is used in each one of them to prevent the nuts from backing off.

The connecting-rod bearings C1. C2, C3 and C4 are liberally proportioned. properly fastened, and the "brasses" are white metal. The half-time gears G1 (the pinion), G2 and G3 are of the herring-bone design, accurately cut and securely fastened to the shafts. The crankshaft is provided with a flange F1 for the flywheel; the workmanship at this point is most exacting.

Perhaps the most notable motor feature of this year from the point of view of this make of automobile lies in the design of the "30" type of motor as shown in Fig. 4. The cylinders C1 and C2 are one of the pairs, C3 and C4 are the remaining pair, they being cast in pairs. The valves instead of being in the head arranged for overhead actuation are in the conventional T-headed way. The magneto M1 is here shown on the left-hand side of the motor, taking its drive without the intervention of a pump by means of a shaft with a universal joint J1, thence to the half-time gear system in the housing G1. The wiring from the magneto is nicely arranged in tubing W1. The starting crank is contrived with a means for holding it in the up position when the automobile is on the road; no strap or other external means being necessary. The lock L1 shows at the side.

Considered from the price standpoint, the long line of the Dayton Motor Car Company offers a wide margin of choice. Beginning with the Stoddard-Dayton "50" model, the fore-door Limousine tops the list at $4,200; Limousine and Landaulet, $4,000 each; Touring Car and Torpedo, $3,000 each; Semi-Torpedo, $2,925; five-passenger and four-passenger cars $2,900 each; Roadster, $2,850, and Speedster, $2,800. The "40" models begin with the fore-door Touring Car at $2,400 and follow on with the Torpedo at $2,350; the regular touring car and five- and four-passenger cars at $2,300 each; the Semi-Torpedo at $2,275, and the Roadster at $2,200. The Limousine and Landaulet in the Stoddard "30" class are listed at $2,700 each; the Coupé at $2,350; fore-door Touring Car, $1,750; regular Touring Car, $1,700, and Roadster, $1,550. The "20" Touring Car is listed at $1,275; the Touring-Roadster at $1,250, and the Roadster at $1,175. In the commercial class the 2½-ton truck is catalogued at $3,000; the 1-ton truck at $1,750, and the delivery wagon at $1,350.

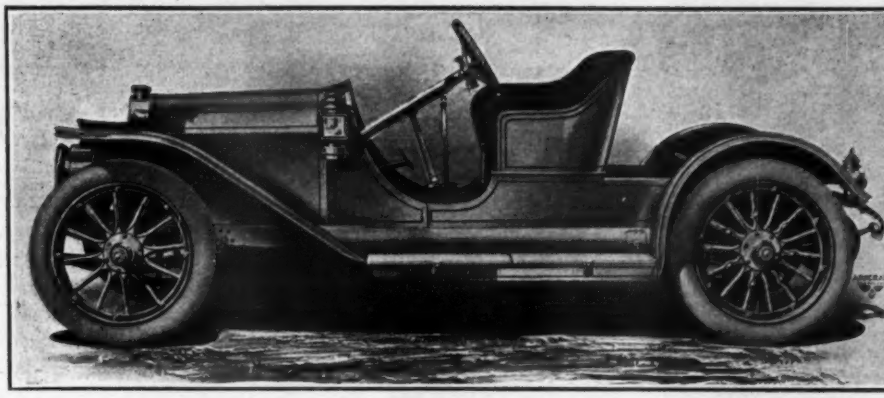


Fig. 9—"Stoddard-Dayton 40" 11-C roadster for two passengers

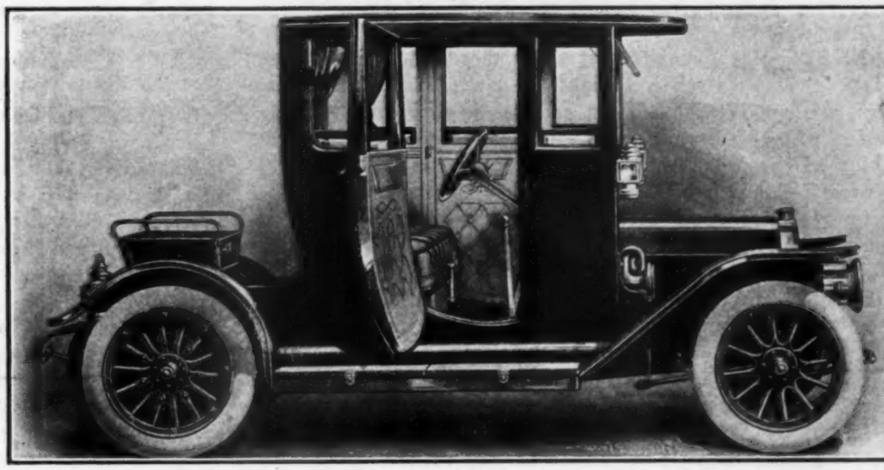


Fig. 10—"Stoddard 30" 11-T coupé for four passengers

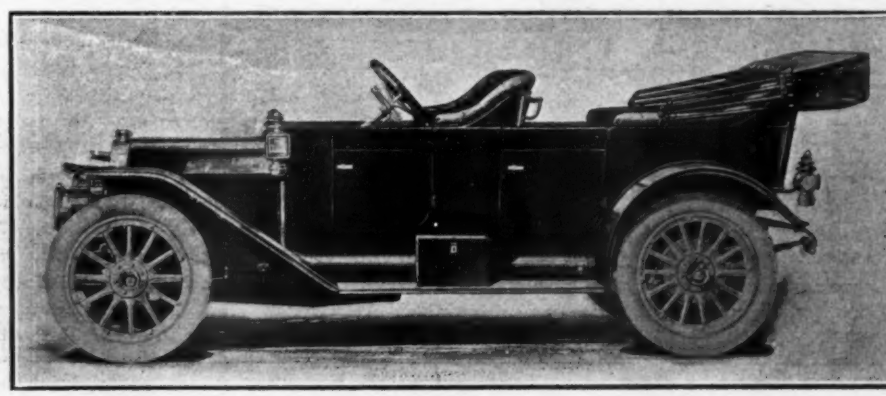


Fig. 11—"Stoddard 30" 11-B fore-door touring car for five passengers

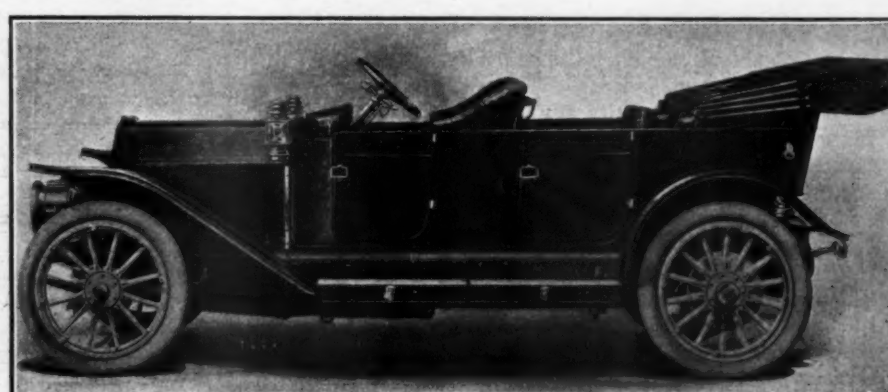


Fig. 12—"Stoddard-Dayton 50" 11-F touring car for seven passengers

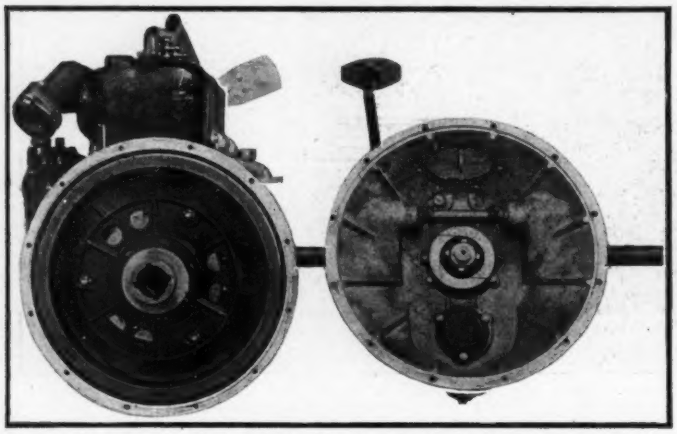


Fig. 1—Looking at the motor with the transmission gear removed, showing the housing in the flywheel

The Hazard Motor

MAKERS of automobiles, especially those who confine their efforts to the relatively light but powerful cars at popular prices, are compelled to face a serious situation involving the question of quality, considering price, and they find that the solution of the problem lies in calling upon specialists for the units required, and it is this condition that serves as the underlying foundation for the success of the specialists who confine themselves to certain classes of work. The Hazard Motor Manufacturing Company at Rochester, N. Y., has taken for its specialty the manufacture of power plants, and experience has taught the company to limit its undertakings to the quantity production of a type of power plant that will be sufficiently good to carry its name and trade-mark out into the world and be a fair representative of that measure of quality that perpetuates an honest effort.

The illustrations as here presented are of the unit power plant as it has been refined and brought up to date, the principal dimensions of which are as follows:

DIMENSIONS AND SPECIFICATIONS OF 24-HORSEPOWER MOTOR

Number of cylinders, 4;
Bore of cylinders, 3 3-4 inches;
Stroke, 4 1-2 inches;
Piston pin bearings, 1 x 2 5-16 inches.

DIMENSIONS AND SPECIFICATIONS OF 30-HORSEPOWER MOTOR

Number of cylinders, 4;
Bore of cylinders, 4 inches;
Stroke, 4 1-2 inches;
Piston pin bearings, 1 x 2 1-2 inches;
Crankpin bearings, 1 1-2 x 2 1-4 inches;
Front crankshaft bearing, 1 1-2 x 2 3-4 inches;
Center crankshaft bearing, 1 1-2 x 2 1-2 inches;
Rear crankshaft bearing, 1 5-8 x 3 1-2 inches;
Camshaft diameter, 7-8 inches;
Flywheel diameter, 16 inches;
Diameter of front support, 2 1-2 inches;
Diameter of rear support, 1 1-2 inches;
Drop from center of rear support to crankshaft center, 3 inches;
Off-set of cylinders, 3-8 inch.
Outlet of water manifold, 1 1-4 inches (diameter of ho'es);
Outlet of exhaust manifold, 2 inches (diameter of steel tubing);
Weight of power plant unit, 450 pounds (without magneto).

Underlying Principle of the Design

The unit power plant with its three-point suspension has for its basis the fundamental idea that the spiraling of the chassis in response to road inequalities shall not be transmitted to the mechanism constituting the rotative members in the power plant. It is a principle in design that external disturbances cannot be transmitted through the shell of a power plant if the same is suspended at three points. It is a recognized fact in machinery designing that bearings must be in strict alignment, if bearing trouble is to be aborted. It is known that deflection is a property in every structural member that is subjected to strain, and the amount of the deflection is the only thing that can be limited by taking proper measures. Men frequently say a large beam, for illustration, when subjected to a light load does not deflect, but it does. When an elephant wants to cross a river he is not averse to using a bridge if he thinks the same is strong enough to carry his weight; how does the elephant determine to his satisfaction as to the strength of the bridge? Does he not strike a blow and observe if there is a quiver, in other words a deflection, or a series of deflections? Relative to the size of a bridge, an elephant is quite small; nevertheless, there is an appreciable deflection, and the elephant being accustomed to gauging such matters, uses his instruments of precision to the best advantage.

The most advanced designers being fully alive to the laws which govern deflections and distortions in members, instead of trying to avoid the inevitable, take advantage of "closed couples" and such other attending functions as will afford to them immunity from interference.

In the unit power plant design all the bearings are brought into correct alignment by the simple expedient of using a single boring bar of great rigidity with a plurality of cutters working simultaneously, resulting in the accurate centreing of all the bearings to a common axis. The crankshaft, as shown in Fig. 4, is first rough-machined and thereafter ground on centers so that it, too, is not only round but the main bearings rotate on a common axis. When the crankshaft is erected into place and is supported by a cylindrical structure, as in the Hazard motor case, it follows that there can be no outside interference because the spiraling of the chassis frame cannot be transmitted through the motor case, nor will there be disagreement within since the main bearings are bored to a common axis and the crankshaft is ground on common centers.

Among the remaining considerations that have to do with the maintenance of correct alignment is the rigidity of the crank-

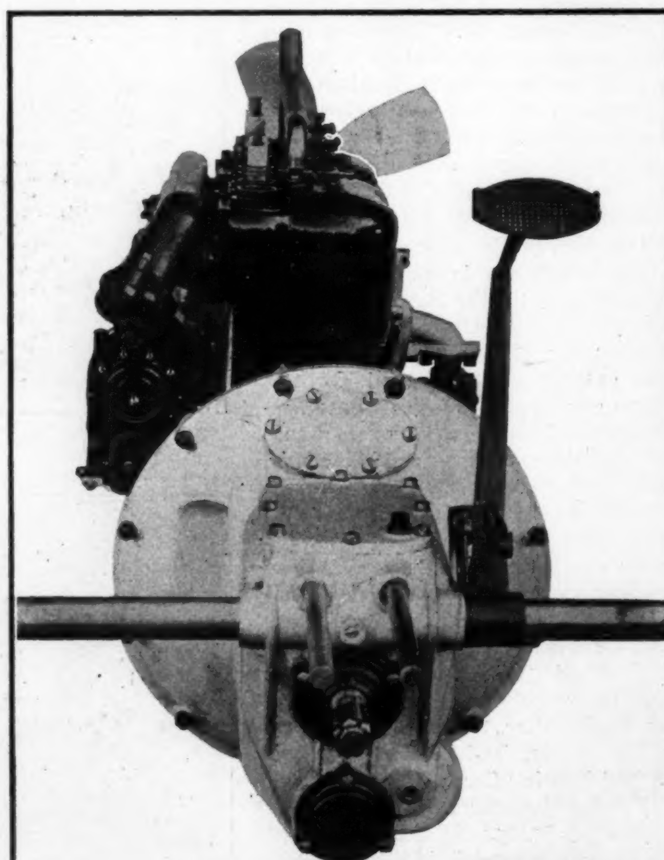


Fig. 2—Looking at the motor from the rear with the transmission gear in place and a brake pedal at the right

PRESENTING THE HAZARD POWER PLANT IN SUFFICIENT DETAIL TO BRING OUT THE FINE POINTS IN DESIGN AND CONSTRUCTION

shaft, for, as will be understood, if the crankshaft is lacking in its ability to interpret the torquing increments, it will be subjected to bending, torsional and shearing moments. The bending moments will have the effect of peening the main bearings, thus making them larger in diameter at the extremities than they will be at the intermediate position, resulting in disaster, however, since the bearing pressure will increase enormously toward the center, and in accordance with the performance with bearing metal, the lubricating oil will refuse to spread over the hot surfaces and the condition of so-called "freezing" will step in. The torsional moment if it is not sufficiently resisted will alter the axlewise length of the shaft just as the length of a rope is made long or short by putting twists into it. The shearing moment is not a matter of serious purport.

As the specifications indicate, the cylinders are offset, it being the aim of the company to make the amount of this offset just enough to compensate for inequalities of piston pressure as they obtain when the cylinders are not offset. This compensating factor affords the advantage of reducing the friction component, hence the total of the fixed losses in the motor, but there is another point that is rarely taken into account. Crankshafts deflect because they are subjected to pressure, and they give out when they are put in a position to resist rapidly varying loads. Offsetting the cylinders is of more advantage from the point of view of reducing the load variation than from the other angle.

Despite the excellent care with which the design has been consummated with a view to reducing the responsibilities of the

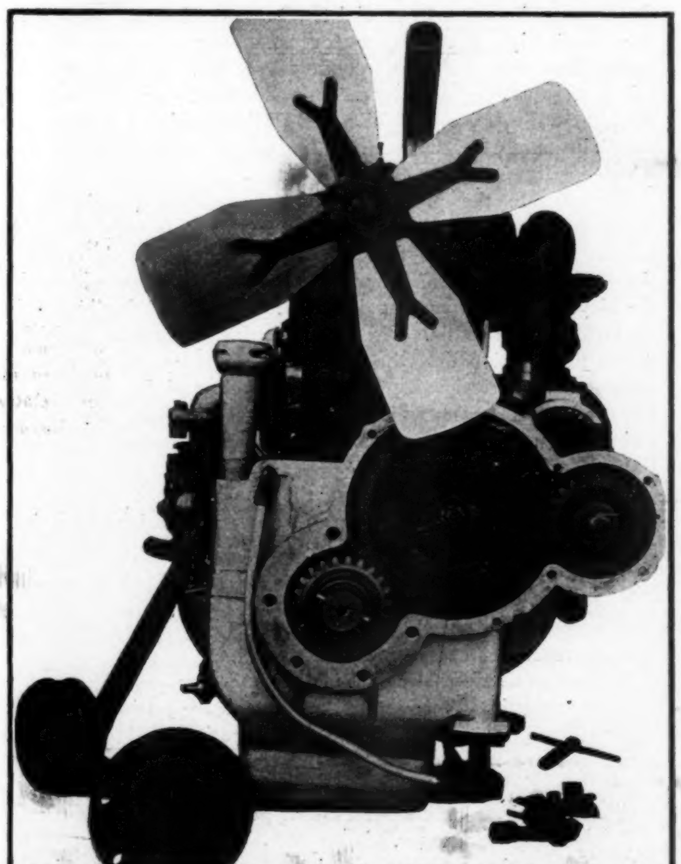


Fig. 3—Looking at the front of the motor, showing the half-time gear housing with the cover off, air propeller and other details

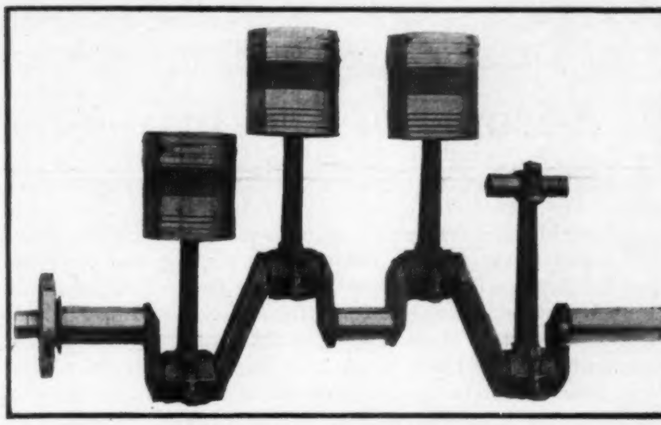


Fig. 4—The crankshaft with the connecting rods and pistons in place, showing a flanging for the flywheel and other refinements

various members, notably the crankshaft, it is the practice in the production of this motor to use the grades of steel that are known to hold kinetic properties, and the method of manufacture, including the process of heat-treating, is with the expectation that the desirable properties are accentuated to the greatest possible extent without reaching into other zones of danger. The shape of the crankshaft and the proportions of the throws are in line with the general endeavor, with the added advantage that quantity production does not lead to diminished quality. In the several other respects the plan of design lends facility to the employment of jigs, special tools and fixtures, all of which add to the rapidity with which the work can be done, to the exclusion of the personal equation, leaving to the artisans but a single choice.

The clutch end of the motor is shown in Fig. 1, it being unbolted at the flywheel housing, thus exposing the flywheel at the left and the clutch mechanism at the right, showing the telescoping shaft and the driving keys. Fig. 2 is a perspective of the motor from an elevated position presenting the same when the two halves of the case are bolted together, showing in the foreground the rear end of the crankcase. The clutch is of the multiple disc type, but instead of being run dry or under fixed conditions of lubrication, a provision is made for supplying a stream of lubricating oil, the same being filtered and used throughout a myriad of cycles.

The transmission gear in its compact housing as shown in Fig. 2 has three forward speeds and reverse, with a selective means of manipulation and a straight line control. The pedal for the clutch is presented in Fig. 2 at the right of the case and is of the extension type. Instead of casting arms integral with the case, and using them to suspend the power plant in the chassis frame, means are afforded for the utilization of drawn-steel tubing, the sizes of which are given in the specifications. The tubing is passed through finished holes, one of which is shown in Fig. 2, and it is found in practice that this method of suspension is both substantial and light.

Referring to Fig. 3 of the front end of the motor, the cover of the half-time gear housing is removed showing the pinion on the crankshaft meshing with the half-time gear on the camshaft, and at the right-hand side the pinion that drives the magneto is also in mesh in the train. When the cover is fastened into place the half-time gear housing is grease-tight, and accuracy of the gears together with the proper centering of the shafts, including adequate means of lubrication, results in noiseless performance. The magneto is placed on the right side of the motor as shown in Fig. 3, but the carbureter is on the opposite side, it being the idea of the designer that the greatest measure for safety lies in separating the fuel system from the ignition system in this way.

One of the main points, and the particular one that cannot be illustrated, lies in the use of selected materials in the construction of the motors, and by means of a well-contrived set of special tools the power plants are turned out in quantity, at a reasonable price, but with such accuracy that they come up to an exacting demand.

Aeroplane Traffic

BY MARIUS C. KRARUP. A REASONED COMPARISON BETWEEN AEROPLANES, MOTOR BOATS, BICYCLES, MOTOR BICYCLES AND AUTOMOBILES, WITH REGARD TO THE CHANCES FOR THE IMMEDIATE GROWTH OF AN AEROPLANE INDUSTRY

AEROPLANE traffic shall be, though Mother Shipton forgot to say so. All are interested in forming and coloring a mental picture of what it will be in five years. Few doubt that it will profoundly affect human life and civilization, sooner or later. The terrors of war will be so abhorrent, many believe, that wars will cease. The cost of collecting import duties on light and valuable merchandise, already exorbitant, will rise to an impossible height, compelling free trade between nations. The values of residence property will undergo a transformation in which aeroplane traffic will be a factor scarcely less important than the railway and the automobile. About these things all may dream. But civilization in general is a complicated structure, and none may be very sure how things will turn out. Otherwise with regard to those features in aeroplane evolution which depend on physical laws and those fundamental human instincts which never change—self-preservation, love of new sights and sensations, desire for control of natural forces, desire for a sense of power with relation to other humans.

The mechanical laws governing aeroplane flight have already been revealed sufficiently to permit a glimpse of the immediate future, a reasoned glimpse. At the present moment suitable design already accounts for ninety per cent., more or less, of the flying qualities of any aeroplane machine, and what may be added to these qualities by putting more money in materials and workmanship counts for correspondingly little. With a very good propeller a ten horsepower motor weighing 150 pounds or more and obtainable in the open market for $150 is likely to do better work in an aeroplane for one or two than that which any of the special aviation motors of higher power and smaller weight can do with a propeller of only ordinary efficiency. The Wright brothers have practically shown this to be true. Louis Bréguet, only the other day, proved still more. Santos-Dumont, by placing his Demoiselle type in the market at a price of $250, without the motor, has shown that good workmanship and materials are not necessarily very costly, and improvement of his design would not change this fact, so long as the question is only of producing aeroplanes with fixed wings and rudder control of the types so far used in practice. These will continue to be very attractive and may undoubtedly be improved in many little ways without increase of their intrinsic cost. As soon as it is generally realized that a little ten horse-power aeroplane which will fly quite well in fair weather may be produced for the price of a little motor boat (whose usefulness and pleasures are also limited to fair weather), the popular demand for such aeroplanes will of course assume enormous proportions. Unless the monopoly of patent rights interferes seriously, motor and propeller equipments will be sold over the counter and farmer boys will make their own structures after patterns obtained from correspondence schools or from enterprising firms exploiting the situation. Of course there will be accidents, many of them, but there will also be a development of a keen sense for weather and weather indications in wide circles, and there will be thousands of brains working overtime to devise improvements in the machines and in the means for ascertaining the meteorological conditions near the earth and in the higher altitudes. As only small size renders cheap construction compatible with strength, all the emphasis is on the small dimensions of these machines and, when the general design is otherwise suitable, on those features which specially contribute to render small dimensions sufficient for support. Aside from a reliable motor, these are mainly safe and efficient planes, a really efficient propeller and reduced air resistances. Since Brégret publicly demonstrated the superior qualities of resilient propellers—a superiority dependent upon correctness in details and a certain correspondence between the propeller action and the speed and torque of the motor—nearly all that is required to give birth to a popular sport which will take possession of the young male population in a degree never witnessed since the halcyon days of the bicycle, is the crystallization into one design of the best features now found in many. The value of flexible elements in the planes has already been demonstrated in two important flights, and planes curved "in series" seem to constitute the only required feature which has not yet been publicly exhibited. There will then appear a monoplane with a 14 to 16-foot span, for one person; a biplane with a 16 to 20-foot span, for two or three persons. Having fixed wings and rudder control, these machines will not be safe in puffy weather, but they will be very attractive and safe enough for a good combination of sporting blood and prudence.

The first glimpse into the future seems to reveal a few hundred thousands of these little flight machines used by the young and hardy for sport and pleasure, for interurban visits, for excursions to sea and mountain, for the exploring of hunting grounds and natural fastnesses not too far removed from the arteries of civilization and the depots of supplies. Low cost as an incentive in the heat of a spectacular aviation movement, world-wide and intense, must find this practical interpretation. And the motor to be used is likely to be one in which the flexibility of the automobile motor will be sacrificed in favor of high reliability at a constant power development, combined with lower price. In other words, the popular motor for little aeroplanes may be a lightweight of the same pattern as that to which the owner of small commercial trucks is looking forward or like the small high-speed motor for boats not yet quite realized. rather than that of the automobile racing car. A clutch will permit a start without assistance and a landing without necessarily shutting off the power, while the gliding qualities will be substantially improved by a propeller whose blades are on edge when not in use.

To estimate the probability of an immense popularity for small aeroplanes of the kind referred to, it is only necessary to compare the factors for and against them with the value of the same factors for and against the motor boat, for and against the bicycle, for and against the motor bicycle, and finally for and against the automobile. The favorable factors may be multiplied above the division line, the unfavorable factors below, when an estimated numerical value is given to each, and the quotient obtained in each case will show, after a fashion, the relative claims upon popularity of each of the five modes of locomotion.

The factors considered above the line may be:

A, representing the population of the territory where each form of locomotion may be practicable and from which it may therefore draw its support.

N, representing novelty.

S, representing speed.

R, representing carrying capacity.

E, representing esthetic satisfaction and sport and

F, representing freedom of movement in getting from one place to any other, in which factor weather and actual road conditions are included.

The factors below the line may be

C, representing cost of purchase or production.

D, representing danger.

L, representing chances of delay, principally those due to troubles with the mechanism and perhaps caused by salt water or bad roads.

I, representing bother and incumbrance in stabling or disposing of the machine when it is not in use.

U, representing dirt, dust and caretaking and

X, representing manufacturing difficulties in producing or delivering a machine of the design and qualities required for realizing the numerical values assumed for the properties denoted by the other letters of reference.

The maximum numerical value used is 10, but for the aeroplane machine this has been doubled for I in consideration of the extraordinary difficulties which, at least for the present, the inhabitants of cities will experience in stabling aeroplane machines. On the other hand, in the case of the automobile, it seems that it might be proper to multiply the final figure by 5 in recognition of the fact that the automobile to a very large extent takes the place of a recognized and long-established utility.

While the figures used are necessarily not above criticism and others may be substituted by readers whose estimate varies from that of the writer, and while it may be subject to dispute whether multiplication and division truly represent the relations which exist between these figures and the effect of the various properties upon "commercial popularity," or the number of machines of each kind to be demanded by the population of this country, the table given herewith should nevertheless supply a foundation upon which any person may build up a rational guess, modified by his own estimate of details, with regard to the probabilities of the immediate future for aeroplanes of the type referred to:

Upper / Lower	$\frac{A}{C} \times \frac{N}{D} \times \frac{S}{L} \times \frac{R}{I} \times \frac{E}{U} \times \frac{F}{X} =$	Co-efficient of Public Demand
Aeroplane.......	$\frac{10 \times 10 \times 10 \times 2 \times 10 \times 5}{3 \times 5 \times 2 \times 20 \times 1 \times x} =$	$\frac{166}{x}$
Motor Boat.....	$\frac{1 \times 2 \times 1 \times 10 \times 5 \times 1}{3 \times 2 \times 3 \times 5 \times 2 \times 5} =$	$\frac{100}{900}$
Bicycle..........	$\frac{10 \times 1 \times 3 \times 1 \times 3 \times 5}{\frac{1}{4} \times 2 \times 1 \times 1 \times 5 \times 1} =$	180
Motor Bicycle...	$\frac{5 \times 2 \times 5 \times 1 \times 3 \times 1}{1 \times 10 \times 5 \times 2 \times 10 \times 2} =$	$\frac{150}{2000}$
Automobile......	$\frac{7 \times 2 \times 5 \times 6 \times 2 \times 3 \times 5}{10 \times 5 \times 1 \times 6 \times 8 \times 2} =$	$\frac{126}{48}$

It may now be inferred from this table that the popularity of the simple aeroplane machine will under all circumstances greatly exceed that of the motor boat and the motor bicycle; that it would rival that of the bicycle, if the chance of getting a satisfactory type of aeroplane manufactured and delivered (expressed in divisor X) were the same as in the case of the bicycle; that it will exceed the popularity of the automobile, if those difficulties in design and manufacture which are expressed by giving X the value of 2 for the automobile, do not run up to more than 62 for the aeroplane; in other words, if the chances for producing an aeroplane whose traveling qualities are somewhat as expressed in the numerical values assigned to it are not absolutely remote or infinitesimal. And if these chances are expressed by the figure 20, which seems a high estimate and one destined to be reduced very rapidly in proportion as the understanding of design requirements becomes public property through the performances of the various types at aviation meets and in long-distance contests, the inference from the table should be in favor of seeing a number of small aeroplanes in use before long considerably exceeding the number of automobiles and beginning to rival that of bicycles. In similar estimates made in other fields, it has been thought that the true numerical relations were much exaggerated by multiplication and division of the factors respectively for and against the estimated result, and that the square roots of the figures representing the "coefficient of public demand" would more nearly represent reasonable expectations. On this basis, and with the value of 20 for X in the case of aeroplanes, the intrinsic public demand for small aeroplanes, bicycles and automobiles would then be represented in the square roots of 8.6, 180 and 2.63, which are 2.8, 13.4 and 1.6, and an expansion of aeroplane manufacture aiming for a production of aeroplanes on this scale should be justifiable. But in all of this one rather important fact has been left out of consideration. It relates to the much smaller than average purchasing capacity which is characteristic of that class in the population who would buy aeroplane machines in which the safety has not been worked out more fully in the very construction of the machine than is here supposed to be the case. The small and cheap aeroplanes are still subject to mortal dangers from wrong estimates of the weather and from occasional motor troubles. Some allowance greater than that involved in the figures given under C for cost and under D for danger, should probably be made for the immediate present, say for two years out of the five next years which constitute the period for which this estimate is worked out, but in practice, and for the period as a whole, it would seem reasonable to hold this consideration to be offset by two others which are favorable, one being the unavoidable progress in design on lines which may not now be foreseen and the other demand for larger and costlier but also almost perfectly safe aeroplanes—as safety in traffic is rated in other forms of locomotion—by which diversity and volume will be added to the aeroplane industry, giving another outlet for manufacturing facilities. Whether the popular demand will swing a little more to the cheap, individual aeroplane or a little more to the aeroplane omnibus and excursion vehicle seems to be a subordinate question which need not be answered till it answers itself, while the fact that a public demand for aeroplanes in general may be reasonably estimated as likely to outgrow in five years—giving the necessary time for development—the present demand for automobiles in the proportion of 2.8 to 1.6 and to approach the demand for bicycles in the proportion of 2.8 to 13.4, in conjunction with the supplementary fact that this estimate can be based almost solely upon what has already been accomplished in aeroplane design and manufacture, seems to be sufficiently remarkable to stimulate investigation of the manufacturing opportunities which have been opened to the world mainly through the practical work of the Wright brothers, though the name of Blériot should not be left unmentioned, and which seem at present to be mainly appreciated, in an industrial sense, in France.

There remains to be indicated the probable development of the complete individual aeroplane built on industrial lines and of substantial materials, costly as an automobile in varying degrees according to its equipment, capable of carrying considerable loads at moderate speed and light loads at enormous speed, safe in almost any weather and second in security against failure of the motor power only to the third type which may be foreseen; namely, the multiple aeroplane, much longer than broad, equipped with a series of motors working by releasable clutches on one or two propeller shafts carrying a series of propellers, controlled mainly through its rows of adjustable wings and intended as a public conveyance or an instrument of war.

(*To be continued.*)

Mountain Work Hard on Brakes and Motors

The advantage of kinetic brakes, so called, rather than to depend upon the friction of the members of the brakes proper is not given the attention that the plan deserves. The average autoist is skeptical, that is to say, he is inclined to the belief that it will damage the motor to use it as a retarding machine. Certainly, if the motor is capable of propelling an automobile up hill it should be able to retard the same weight down hill. If a car goes up hill at the rate of 20 miles per hour the motor must do a certain amount of work and in going down the same hill at the same speed, if it is to serve in the capacity of a kinetic braking system, it will be required to do exactly the same amount of work as is represented by the propelling of the car up the hill.

When the brakes (proper) are used, owing to the friction of the members, they wear out. But when the motor is used instead the work comes upon well-lubricated bearings, which last just as long under the work imposed upon them when the car is going down hill, as under other road conditions.

Worcester Automobile Club

Library and Billiard Rooms

Ladies Reception Room

Ladies Dining Room

C. E. Greene
V. Pres.

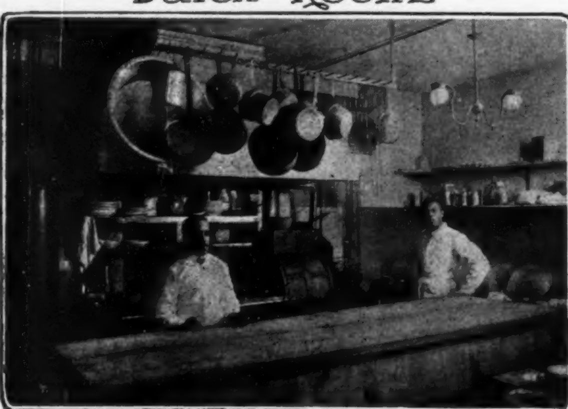
M. C. Snyder
Treas.

D. F. Gay
Pres.

H. F. Blanchard
Sec.

R. W. S. Negus

Dutch Room



The Well Equiped Kitchen

IN sharp contrast to many automobile organizations, the Worcester (Mass.) Automobile Club "gets action" on everything it undertakes. It is the progressive spirit behind the club that marks it as something out of the ordinary. It is the same spirit that has pushed the club forward and made its name mean something to motordom.

Formed over ten years ago for the sole purpose of increasing and fostering interest in automobiles and motor car sports, the club after a typical winning struggle stands out to-day as one of the foremost organizations of its kind in the United States.

To the outsider the fame of the club rests to a large extent upon its success in conducting a series of five hill-climbing con-

tests which were amply noticed all over the automobile world. But in a larger sense the club has been of even more potent force in popularizing the automobile in its territory.

When it was born in 1900 there were 15 owners of automobiles in Worcester, and J. M. Bigelow and William J. H. Mourse, two of the pioneer motorists of that city, had considerable difficulty in getting them to affiliate in a club. Mr. Bigelow was chosen first president, when the motorists finally decided to get together and the meetings of the organization were held at his home during the early days. In 1904 Asa Goddard and B. A. Robinson took hold of the organization, raised the membership fee to $5 and secured headquarters at the Bay State House. Mr. Goddard was elected president.

At first the club had a single room in the basement of the hotel, but after two years more adequate quarters were taken on one of the upper floors. As soon as the club issued forth from its chrysalis form it assumed a commanding position in the automobile life of Worcester. In 1905 John P. Coghlin was selected to head the club, which by that time had 40 members and an income of sufficient size to finance its activities in an economical way.

With the advent of Mr. Coghlin the club began to grow rapidly and after he had been in office a year a suite of seven rooms were leased in the Chase building and the club spent $8,000 in fitting them up in comfortable style. The dues were doubled and despite the raise the membership continued to swell until now its rolls contain the names of nearly 1,000 of the prominent and influential men of Worcester and vicinity. The list includes leaders in society, business and professional life, and naturally enough the club has a distinct influence on about everything of importance that is to-day presented to Worcester's consideration.

The work of Mr. Coghlin was of a high order and the club endeavored to persuade him to accept a sixth term as president. He declined, however, and at the last election Daniel F. Gay was chosen to succeed him. Mr. Gay is also an aggressive official and much progress has been made under his administration.

For five years the club has conducted a hill climb on Dead Horse Hill, a straight but very stiff grade. The entry lists have always been typical and some remarkable achievements have been attained in the various events. During the past summer the club promoted a track meet which was thoroughly successful.

And yet with that record to look back upon the club is not a sporting organization in any sense. Neither is it a social or political organization. It has a decalogue which outlines its main objects as follows:

First—In scrutinizing legislation for a square deal for motorists.

Second—In boosting interest in automobile and motor car sports.

Third—In securing good roads both in the city and its suburbs.

Fourth—In the erection of signs indicating directions and speed limits.

Fifth—In controlling speeders and autoist lawbreakers.

Sixth—In promoting sociability among its members.

Seventh—In giving its members and friends the best regardless of cost in the line of clubrooms and comfort.

Eighth—In promoting the club by increasing its membership among autoists.

Ninth—In the registration of chauffeurs and owners, and lastly

In conducting functions, such as club runs, entertainments and the annual outings for the orphans and poor children of the city.

The present quarters of the club include ten rooms and the furnishings and fittings are attractive and comfortable. The cuisine of the club is gaining a wide reputation and its patronage is growing by leaps and bounds.

Frequently high personages in the business and political world have tasted the hospitality of the club and the members never yet have had cause to feel ashamed.

To-day the club is free from debt of all sorts and is in commendable conditions in every way.

The officers are as follows: Daniel F. Gay, president; Chester E. Greene, vice-president; Henry F. Blanchard, secretary, and Milton C. Snyder, treasurer. The board of governors includes the four officers named and Alfred Thomas, M. A. Macker, John W. Harrington, Charles Case, William F. Whipple and R. W. S. Negus.

Plans are already afoot for the sixth annual hill climb, which is scheduled to be held in June, 1911.

Coming Events

CALENDAR OF FUTURE HAPPENINGS IN THE AUTOMOBILE WORLD THAT WILL HELP THE READER KEEP HIS DATES STRAIGHT—SHOWS, RACES, HILL CLIMBS, ETC.

Dec. 1..........Chicago, Ill., First Annual Aeronautical Exhibition in the Coliseum.

Dec. 31-Jan. 7, '11.New York City, Grand Central Palace, Eleventh Annual International Automobile Show.

Jan 7-14, 1911...New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Manufacturers.

Jan. 16-21, 1911..New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.

Jan. 28-Feb. 4,'11.Chicago Coliseum, Tenth Annual National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Pleasure Cars and Accessories, Exclusively.

Feb. 6-Feb. 11,'11.Chicago Coliseum, Tenth National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Commercial Vehicles, Pleasure Cars, Motorcycles and Accessories.

Mch. 4-11, 1911...Boston, Mechanics' Building, Ninth Annual Show, Licensed Automobile Dealers' Association.

Races, Hill-Climbs, Etc.

Sept. 16..........Algonquin, Ill., Annual Hill Climb of Chicago Motor Club.

Sept. 17..........Syracuse, N.Y., Track Meet of Automobile Club of Syracuse, Syracuse Automobile Dealers' Association and the New York State Fair Association.

Sept. 20-22.......Louisville, Ky., Reliability Run, Auto Club, Louisville.

Sept. 24..........Belmont Track, Narbeth Race Meet, Norristown Automobile Club.

Sept. 28-30.......St. Louis, Mo., Third Annual National Good Roads Convention.

Oct. 1............Long Island Motor Parkway, Vanderbilt Cup Race, Wheatley and Massapequa Sweepstakes.

Oct. 3............Louisville, Ky., Reliability Run, Louisville Automobile Club.

Oct. 6-8..........Santa Anna, Cal., Track Meet.

Oct. 7-8..........Los Angeles, Cal., Speedway Meet.

Oct. 8............Philadelphia, Fairmount Park Race, Quaker City Motor Club.

Oct. 14-18........Washington, D. C., Start of Washington Post Reliability Run to Richmond, Va.

Oct. 15...........Long Island Motor Parkway, Grand Prize, Automobile Club of America.

Oct. 15-18........Chicago, Ill., Chicago Motor Club's 1,000-Mile Reliability Run.

Oct. 27-29........Dallas, Tex., Track Meet.

Nov. 3-5..........Atlanta, Ga., Speedway Meet, Atlanta A. A.

Nov. 5-6..........New Orleans, La., Track Meet.

Nov. 6-9-13.......San Antonio, Tex., Track Meet.

Nov. 24...........Redlands, Cal., Hill Climb.

Nov. 24...........Savannah, Ga., Road Race, Savannah Automobile Club.

Foreign Shows and Races

May 1-Oct. 1.....Vienna, Austria-Hungary Automobile and Aviation Exposition.

Aug. 1-Sept. 15...French Industrial Vehicle Trials.

Oct. 15-Nov. 2....Paris, France, Aeronautical Society Show.

THE AUTOMOBILE

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REFINEMENTS are made from season to season as the finger of necessity points the way, but it cannot be said that necessity is the servant of the user of the automobile in every case.

* * *

NECESSITY may be the servant of the maker, rather than of the user, in which event it stands to reason that direct benefit will accrue to the maker rather than to the user.

* * *

BUT this situation, while it has its misfortunes, is not good ground for contending that the advances that are indicated by real experience should not be indulged in.

* * *

WHEN a maker puts forth his initial effort and he finds by after experience that some of the details of design and construction are lacking in stamina, what remains but to make the necessary corrections at the earliest possible moment?

* * *

WHAT are necessary corrections? Is it necessary to correct all the automobiles that were previously placed in the hands of the users, as well as to eliminate the faults thus discovered, this being the reason for making changes?

LEGALLY, no. Morally, perhaps. Wisdomly, yes. Why, for a round dozen of reasons. What are some of the reasons for claiming that faults should be corrected in the cars that are sold and paid for?

* * *

PRIMARILY, if the money paid in for a car is not counterfeit, the car should not be counterfeit. The law of fair dealing demands that an equivalent shall be extended to the purchaser.

* * *

EXPEDIENCY, business acumen, and the precedents that accompany ultimate success, all point the way to the correction of error by the one who errs.

* * *

WHAT is the reward of merit? Success, lasting success. What is the price of infamy? Degradation, downfall, oblivion. Merit is best defined in the process of making good. If a device is not what it should be, what a splendid advertising medium will the purchaser become if he is treated like a white man!

* * *

ADVERTISING—what is advertising? Is it horn-tooting? Would it avail a burglar anything to toot his horn? Imagine a two-color insert with 72-point bold-face type proclaiming: "I am a burglar; my skill is known to even the Bank of England"!

* * *

BUT a satisfied client; a man who, in good faith, pays down good, honest money; takes title to an automobile, and, after running it a week, finds that (a) the rear wheels will not stay on, (b) the clutch will not hold, (c) that the motor is so defective that it is worthless for the purpose; supposing the maker should say to this man: "Come, let us treat you fairly; here is a good automobile to replace the bad one that we delivered to you for your good money." The result?

* * *

FIRST, the maker, feeling absolutely honest, becomes strong. Then, the bank, realizing that the maker is strong, leaves the "latch-string" out. Again, the men who work for the maker, knowing that he is a fair man, do twice as much work, and better work, every working day. But the user, what of him?

* * *

JUST think of it: The user, the man who was treated fairly; the customer who, after getting a defective car, was advised that it would be exchanged for a car that would measure up to the promise of the maker—remember, just up to the promise of the maker; no more.

* * *

IS it too good to be true? In some instances, perhaps; in other cases, no. One of the now most successful makers of automobiles on the American market replaced every automobile it made during one year. Did the company go broke, so to speak? No. It made just so many four-page, two-color inserts in a paper that has a circulation of 90,000,000, that goes to press every day in the year—the company advertised and it won out.

Premier Injunction Denied

SUPREME COURT JUSTICE PUTNAM DISSOLVES TEMPORARY ORDER RESTRAINING DELIVERY OF GLIDDEN TROPHY TO CHALMERS COMPANY

ON the ground that the Court would not assume jurisdiction to overset the ruling of a duly constituted sport-governing body in the absence of fraud alleged and shown, Justice Putnam, of the Supreme Court of New York, has dissolved the temporary injunction applied for by H. O. Smith, president of the Premier Motor Manufacturing Company, to prevent the Contest Board from turning over the Glidden Trophy to the Chalmers Motor Company.

The opinion of the Court is as follows:

This is a motion to continue the temporary order of July 23d, restraining the delivery of the 1910 Glidden Trophy. The referee, Mr. A. H. Whiting, decided in favor of plaintiff's car. The Contest Board, however, sustained an appeal and awarded the trophy to the Chalmers Motor Company. Plaintiff charges that this action of the Contest Board was unwarranted, being against the Association rules, contrary to the terms and conditions under which the contest took place, and a breach of the trust created by the donor's deed of gift. This suit seeks to set aside the decision of the Contest Board and to reinstate plaintiff as winner.

In 1905, Mr. Charles J. Glidden offered this trophy for yearly competition under the terms of a deed of gift to the American Automobile Association, providing for the adoption of rules to govern such contests. This was to be a reliability run, since called the "Glidden Tour." The deed of gift (as later modified) declared that this trophy should be competed for annually by members of the Association, and that the winner should hold the trophy until won by another. The A. A. A. had adopted various rules through its Contest Board, to which has been delegated the regulation of such competitions. In March, 1910, the Contest Board issued advance copies of a set of rules, called the 1910 Contest Rules, intended to govern the various competitions to be conducted under sanctions issued by that Board on behalf of the Association. These were subdivided to apply to many different contests, including reliability tests.

The purpose of the Glidden Tour is to try out and test the endurance of what manufacturers call a "stock car," that is, a car such as is regularly sold to purchasers, and not one specially equipped for a contest. In the rules for 1910, the entrant was required to file a stock car certificate of description, in which the details of the car were fully set forth. A technical committee was to make a preliminary inspection of the stock car to determine if it corresponded with the stock car certificate. Various provisions were made as to the examination and report by this technical committee, as well as regulating the penalties in the contest after the cars should have entered upon the tour.

Plaintiff was the entrant in the 1910 contest of a Premier car. In the certificate of description was mentioned a hand oil pump and oil tank. This car was duly examined by the technical committee and declared to be eligible. During the tour a protest was made, upon the claim that this hand-pump to inject oil into the crankcase of the engine of the Premier car was not a part of the regular stock equipment. At the conclusion of the tour, in which plaintiff's car showed the best score, this protest was considered by the referee, who deferred action until he had received a special report from one of the technical committee who had visited the factory of the Premier Motor Manufacturing Company. Subsequently, the referee overruled the protest and declared plaintiff's car the winner. The Chalmers Motor Company, who had entered a car in the name of the defendant, George W. Dunham, appealed from this decision to the Contest Board, which, after notification to the plaintiff, took up the appeal on July 21st, and after receiving proofs by affidavit and hearing arguments, on July 22d, sustained the appeal of the Chalmers Motor Company, on the ground that there was no sufficient evidence to prove that the auxiliary oil tank and pump equipment was stock equipment, so that the Premier Company had failed to furnish evidence sufficient to establish the stock status of its cars entered in respect to this lubricating equipment, and for that reason the Premier cars were disqualified.

It is a primary principle of all sporting contests that rules must be made by the bodies conducting them, and that those regularly appointed must decide who wins. The entrants in such competition, as a matter of fairness, agree to abide by the decisions of the umpires, referees, or boards having jurisdiction, as the rules may provide. Especially is this true in a contest where the points of eligibility are highly technical, and the Association is composed of experts who themselves are well fitted to judge. Before a dissatisfied entrant can ask the courts to interfere and set aside the rulings of a sport-governing body there must ordinarily be evidence of fraud, either by a competitor, or by the official making the decision. The track judges, umpires, referees, executive committees, and governing boards of such associations are supreme within themselves when acting under their recognized authority. If they give the parties concerned a fair opportunity to be heard, and there is evidence on which their findings can be based, their decisions, in the absence of fraud, are not subject to judicial review. Thus, Judge Gildersleeve, delivering an opinion reversing a special term order which granted an injunction in favor of a disqualified contestant at a race track, said:

> "When the original contract was entered into, * * *, the owner of the said colt, in effect, subscribed to the defendant's rules, and they are binding upon his successor. Those rules named the tribunal to which any dispute, that might arise out of the contract, should be submitted. That tribunal was the executive committee of the defendant corporation. They had jurisdiction of the cause of action alleged in the complaint herein, and it was the duty of the plaintiff to submit to their decision." (Corrigan v. Coney Island Jockey Club, 48 N. Y. St. Rep. 582, 586.)

These principles have been generally recognized. The fact that this trophy is of large value and that, although in the form of a sporting contest, the tour really affords a test of the endurance of a car, from which important financial consequences ensue, does not change the rule. Such consequences flow from many modern sporting contests, but these results do not give the court jurisdiction.

The rule that courts of equity will interfere to secure the possession of valued objects having a sentimental interest to the owner comes under a different head of the jurisdiction. Plaintiff's proceeding, while nominally to gain possession of the trophy, is in reality to obtain a reversal of the present award, with a reinstatement of the Premier entry as the winner. Were jurisdiction entertained proof would be naturally taken with respect to the equipment of the 1910 Premier cars from nearly all the large cities of the United States. On this motion, 73 affidavits from 26 cities have been submitted. Upon a hearing on the merits, even with the utmost diligence, such a mass of testimony from widely dispersed points might require several months for its completion. After decision rendered thereon, appeals would naturally follow, so that the final judicial ascertainment of the result of the 1910 Glidden Tour might not be reached until other Glidden tours had in the meantime taken place. Heretofore, the law has declined this jurisdiction not based on those property rights usually cognizable by courts. To change now and hear the loser in court would also imperil the spirit and interest in all such contests.

In the present case, the objections to the form of the appeal and to the proceedings before the Contest Board are largely technical. While in some respects informal, such proceedings do not appear to lack any substantial protection to all concerned. The high standing of the parties forbids the suggestion of fraud; in fact, upon the argument it was acknowledged that there was no fraud as to anyone involved. In the absence of fraud, the question for the court is not whether passing primarily upon the evidence, it would have reached the same conclusion as that of the Contest Board, or whether their conclusion was reasonable or unreasonable, but simply and wholly whether the case before them was so bare of evidence to sustain the decision that no honest mind could reach the same result (People ex rel. Jackson v. New York Produce Exchange, 149 N. Y. 401, 414).

No winner of this trophy has a right to hold it for more than one year, and its ownership remains in the American Automobile Association. There is, therefore, no necessity to impose the terms of a bond conditioned to conform to any future order of this court, as the Association is a responsible defendant able to comply with any final decree.

The temporary injunction is vacated and dissolved, with costs. September 8, 1910.

Plaintiff Says Fight Will Go On

Harold O. Smith, president of the Premier Motor Mfg. Co. of Indianapolis, entrant of the Premier cars in the recent Glidden tour, telegraphed the following message to THE AUTOMOBILE:

CHICAGO, Sept. 13.—The action of Mr. Justice Putnam in refusing to continue in force the temporary injunction issued in the suit brought by me against the American Automobile Association, Chalmers Motor Company and others, to set aside the decision of the Contest Board and to restrain the delivery of the Glidden Trophy to the Chalmers Motor Company, will have no effect upon the vigorous prosecution of this action.

The statement purporting to have been made by the Chalmers company to the effect that the Supreme Court of New York has awarded the Glidden trophy to the Chalmers Motor Company and has fully sustained the action of the Contest Board, is wholly without foundation in fact.

The decision of the court in no way determines the propriety of the action of the Contest Board or settles the merits of the controversy, nor does it attempt to do so, and the preliminary injunction was refused, apparently upon the theory that the issues cannot be finally determined during the year within which the winner of the 1910 contest will be entitled to the custody of the trophy, and that the A. A. A. is a responsible body, subject to the jurisdiction of the court and can be compelled to comply with the terms of any decree entered.

I have instructed my attorneys to set the case down at the earliest possible date for a hearing on the merits and to proceed without delay to a final determination of the issues involved. Much as I deplore the necessity for this course, I am determined, not alone in my own interest, but in the interests of clean, wholesome sport, to obtain a decision from an impartial tribunal, and if necessary a court of last resort, as to whether or not the Premier cars driven in the 1910 Glidden tour, after having established so conclusively their superiority over all other cars driven in the contest, can be disqualified in the manner attempted and the trophy awarded to a manufacturing corporation not an entrant, in utter disregard, as it seems to me, of the plain provisions of the rules. The fight has just begun. (Signed) H. O. SMITH.

French Rights to Twombly Patents Sold

W. Irving Twombly, of the Twombly Motors Company, has received a cable from Paris announcing the sale of the French patent rights of the Twombly Power Company to Bernard Maimon, the proprietor of *Le Matin* of Paris, France.

Looking down the course from grand and judges' stand

Hicksville turn into the long straightaway back-stretch

The S-Curve just beyond Meadow Brook Lodge, near Garden City

Westbury turn—sharpest and most dangerous on the course

Vanderbilt Cup of 1910

THE premier sporting event of American motordom, the Vanderbilt Cup race, will be decided October 1 on the Long Island course of the Motor Cups Holding Company. A magnificent list of entries has been made to date and as the entry box will not be declared closed until September 24, considerable additions are expected.

The course for this year's race is identical in length and territory with that of 1909, but material improvements have been made in the surfaces of certain portions of the route so that higher speed and less tire trouble than ever before are looked for. The course is situated in Nassau County and is 12.64 miles long. Of this distance, 5.15 miles are over one of the fine stretches of the Long Island Motor Parkway and 7.49 miles are county roads. The race requires 22 circuits of the course or 278.08 miles. The start will be at dawn and the finish probably about four hours later.

The history of the event has been glorious. William K. Vanderbilt Jr., a pioneer in American motoring, instituted the cup race that bears his name in 1904 when he offered a trophy to be contested for in a race of from 250 to 300 miles on a road course. Under the conditions the trophy was to be contested for by teams of cars from clubs that were recognized by automobile authorities, and consequently the entrants did not compete as individuals. The same conditions prevailed in the following year.

The first contest took place October 8, 1904, with sixteen starters, representing four teams, those of France, Germany, Italy and the United States. The race was won by a Panhard 90-horsepower car driven by George Heath, a member of the French team, despite the fact that he was an American amateur. The race was 284 miles long and the winner averaged 52 miles an hour and had only a slight margin at the end.

In 1905 a Darracq driven by Hemery was the winner with an average of 61 1-2 miles an hour. In this race Lancia in a Fiat was eliminated as a winning factor while far in the lead, through a collision with a freak car that he thought he could avoid. In 1906 France scored again with a Darracq driven by Wagner with an average speed of 63 miles an hour.

Changing conditions resulted in some radical alterations in the deed of gift covering the Vanderbilt trophy and no race was held in 1907. In the following year, the custody of the cup having been vested in the Motor Cups Holding Company, the race was renewed and on October 24, 1908, a 90-horsepower Locomobile, driven by Robertson, was returned the winner. The average time made by the winning car was 64.3 miles an hour, the fastest time ever made in a cup race under like conditions. In this race, under the amended terms of the deed of gift, the cars competed as individuals.

Last year saw the cup won by a six-cylinder Alco, driven by Harry F. Grant, with an average speed of 62.8 miles an hour for the 278.08 miles of the race. A Fiat, driven by E. H. Parker, was second.

In connection with the big race last year, two shorter sweepstake events were run coincidentally, the Massapequa trophy at 126.40 miles for $1,000 and a cup and the Wheatly Hills trophy at 189.60 miles.

It may be predicted with certainty that there will not be an uninteresting second from the moment the first car is sent away until the last one finishes. Given a pleasant day the attendance undoubtedly will break some records. In the past, the chief item about which there may have been criticism of the management of the contest has been the fact that after the first and second cars finished the race, the spectators swarmed upon the

SIXTH ANNUAL RACE FOR TROPHY, CASH AND HONOR TO BE HELD OCTOBER 1 WITH A STRIKING FIELD OF CARS AND DRIVERS

course and the resulting congestion in the vicinity of the grand stand forced the officials to declare the race off before the rest of the contestants were able to finish.

This crowding resulted in jeopardy for hundreds and was an injustice to the unplaced cars. Take for example the case of a car that is lower in power and price than the winner and second. If that car has an opportunity to be checked in in third or fourth place, and ahead of many other automobiles, the honor of making a creditable run and finishing close to the winner and placed cars is a distinct consideration.

This year a determined effort will be made to give the contesting cars a chance to finish without interference. The conditions of the Vanderbilt Cup Race are as follows:

Open to Class C; divisions 4C and 5C. Division 4C includes gasoline cars or chassis made by a factory which has during the last twelve months prior to the date of the contest produced at least 50 motor cars (not necessarily of the same model). Eligible for entry under piston displacement limitations of Class B, but without minimum weight restrictions. The limits for piston displacement in this class are from 301 to 450 cubic inches.

Division 5C is the same as above, except that the piston displacement limits are from 451 to 600 cubic inches.

Under the terms of the award, if one of the 4C cars wins the cup and cash, the most prominent of the 5C cars will be awarded a special "Donor's Trophy" for permanent ownership.

If the present prospect of twenty-five starters is realized in the cup race and if the starters in the Massapequa and Wheatly Hills trophy races total fifteen, which is said to be a conservative estimate, there will be forty cars in simultaneous action during the early hours of October 1. On as short a circuit as is afforded by the Vanderbilt Cup course this would place the cars about fifteen seconds apart, if they should be separated by regular intervals during any part of the running. The scene at any point along the route is thus bound to be full of action.

The Massapequa trophy race is open to cars of from 161 to 230 cubic inches displacement of Class B, division 2B; minimum weight 1,400 pounds and is ten times around the circuit.

The Wheatly Hills trophy race is for Class B, division 3B, open to cars of from 231 to 300 cubic inches piston displacement.

The entry lists of both sweepstakes events will close September 24. From September 20 to the day of the races practice will be allowed over the course from 5 until 8 A. M., the roads being closed to traffic during those hours.

With a full dozen days more to go before the entry boxes close, the entries for the three races are as follows:

For the William K. Vanderbilt, Jr., Cup—

Practice Number	Car	Driver
1	Benz	Robertson
2	Benz	Hearne
3	Benz	Bruce-Brown
4	Alco	Grant
5	Pope-Hartford	Fleming
6	Pope-Hartford	Dingley
7	National	Aitken
8	National	Livingston
9	Lozier	Mulford
10	Simplex	Mitchell
11	Simplex	Beardsley
12	Marquette-Buick	L. Chevrolet
14	Marquette-Buick	Burman
15	Marqette-Buick	A. Chevrolet
16	Apperson	Hanshue
17	Marmon	Dawson
18	Marmon	Harroun

For the Massapequa Trophy—

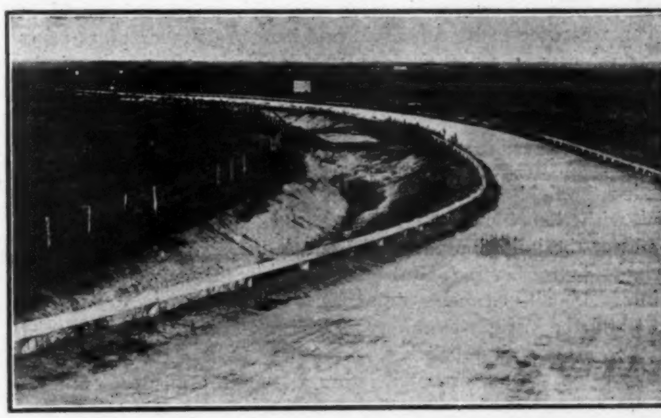
	Car	Driver
	Cole	Endicott
	Mercer	Sherwood
	Cole	Edmunds

For the Wheatly Hills Trophy—

	Car	Driver
	Marion	Basle
	Marmon	

The road a mile east of Parkway—bridge over Jericho turnpike

New road which leads from Westbury to Meadowbrook Lodge



Going toward grand stand, which is about 1½ miles away

Banked turn at Massapequa Lodge, where Parkway section ends

Recent Events Among Aviators

PRIZES DISTRIBUTED AT HARVARD-BOSTON MEET—AERONAUTIC MILITARY RESERVE—WIRELESS WITH DIRIGIBLES

THOUGH the proportion between spectators inside the pay gates and those outside at the Harvard-Boston aviation meet has generally been as one to two, the first week totaled about a quarter million of paid admissions, it is stated, and it was decided to prolong the event from Sept. 13 to Sept. 15. The city of Boston and the international mining engineer John Hays Hammond have offered money prizes for successful bomb-throwing at a dummy battleship target from altitudes of 1800 feet or higher, the competition to take place on the two additional days of the meet.

Only the Wright machines have competed in the important slow-flight contests scheduled. On Sept. 8 Walter Brookins flew a lap or 5 1-4 miles in 13 minutes 48 seconds. Two days later Johnstone flew 63 miles in 2 hours 3 minutes 5 2-5 seconds and on Sept. 12 he stayed up for 3 hours, 5 minutes, 40 seconds, covering 101 miles, which was record for duration of a single flight. The slowest flight was thus at the rate of 22 3-4 miles per hour. Previously a short flight at the rate of 19 miles per hour had been reported. The record for the shortest getaway on wheels, in which machines with skids cannot compete, was made on Sept. 9 by Graham-White in the Blériot monoplane. A first attempt gave a start in 52 feet 6 inches, the second cut this to 39 feet 10 inches, and finally it was reduced to 26 feet 11 inches. In this contest the power of propulsion and the force of the wind play an important part, while in the slow-flight trials the wind may be eliminated as a factor by prescribing a circular course and the power is unimportant, the whole emphasis being on general efficiency of design and construction. On Sept. 12 Graham-White flew in his Blériot machine from the field at Squantum twice to Boston Light and back, a distance of 33 miles in 34 minutes, 1 1-5 seconds, bettering his speed record of the previous week about 6 minutes, and winning the $10,000 speed prize of the meet without competition. On the same day Lieutenant J. E. Fickel flew with Willard in a small Curtiss biplane and fired with an army rifle at targets on the ground while circling the field at more than 30 miles per hour. Wilbur Wright flew with Brookins and practiced throwing plaster of paris bombs at the imitation battleship, succeeding in scoring 77 points with 37 balls, beating Graham-White's previous record of 75 points. In all, Graham-White won $22,100 in prizes at this meet and the Wright team $9,250. Clifford B. Harmon captured all the amateur first prizes.

Nearly all the prominent aviators at the Boston meet enrolled themselves as members of the United States Aeronautical Reserve, an organization which was founded during the progress of the event by J. H. Ryan, a son of Thomas F. Ryan of New York for the purpose of training many aviators in the art of throwing bombs. A trophy valued at $10,000 and a valuable cup are to be competed for by the members. The organization is to be international in scope and membership, military in purpose.

James H. Moore, an owner of theaters in Rochester, N. Y., and Detroit, Mich., has offered a prize of $10,000 for the first flight between the two cities, the conditions to be decided by a committee of aviators.

Charles K. Hamilton, the aviator who flew from New York to Philadelphia and back this summer, flew at Sacramento, Cal., on Sept. 9 and sustained severe injuries at a fall due, he said, to the jamming of a rudder.

Hawthorne race track at Chicago near the Indiana boundary, has been leased for the meet to be held in Chicago, Oct. 1 to 8 and also for the following week, as a starting ground for contestants in a race from Chicago to New York organized by two newspapers offering a prize of $25,000 for the winner, if any.

At the Harvard-Boston meet on Sept. 10 Glenn H. Curtiss introduced the "Flying Fish," a new biplane of Curtiss-Burgess manufacture, equipped with "Indian" motor and Burgess propeller.

Robert Loraine, an actor, flew on Sept. 11 from Holyhead, Wales, aiming for Dublin, and dropped into the Irish Channel 400 yards from Bailey Lighthouse at the coast of Ireland.

Paris as a municipality offers a prize of $20,000 to any French-born aviator who flies from Paris to Brussels and back on Sept. 26.

The Bayard-Clément, a French military dirigible balloon, has been equipped with a specially light wireless telegraph apparatus and has sent and received messages over a radius of 56 miles.

"America," the dirigible with which Walter Wellman, with a crew of five proposes to cross the Atlantic ocean, is 228 feet long, has a maximum diameter of 52 feet and a volume of 345,000 cubic feet. It has been equipped with a wireless telegraph apparatus for sending and receiving designed by A. F. Collins of New York City. This involves the use of a cable dragging in the sea to act as a grounding wire. The date of departure from Atlantic City, it is stated, will be announced 24 hours in advance, if the weather permits.

Previous altitude records by Brookins, Drexel and Leon Morane were broken by the latter on Sept. 3 near Paris, Morane this time reaching a height of 8,151 feet in a Blériot monoplane.

Prof. A. Lawrence Rotch of Harvard and Blue Hill Observatory is preparing to furnish charts of the normal air currents in different altitudes based on observations made for the past 15 years by means of kites and small balloons. As the work covers a large part of the Atlantic ocean, it is believed that it will greatly assist in crossing this water by dirigible or aeroplane, favorable currents being available as a rule by selection of place and altitude.

According to a press dispatch, Duralumin is a new alloy of aluminum discovered by H. B. Weeks, head chemist at Vicker's Sons and Maxim's Works, Barrow. It is described as a little heavier than aluminum but as strong as steel, and the firm is building new works at Birmingham, Eng., for its production. The discoverer of the alloy declares that it may be rolled, drawn, stamped, pressed and forged and is one-third the weight of brass. Commercial manufacture is to begin in October.

S. A. E. Striding Forward Rapidly

The following were elected, this week, members, associates, and juniors of the Society of Automobile Engineers:

James C. Angelino, Carlson Motor & Truck Co., Philadelphia, Pa.
Edwin E. Arnold, Metal Products Company, Detroit, Mich.
C. P. Brockway, Inter-State Automobile Co., Muncie, Ind.
Wm. G. Bee, Edison Storage Battery Co., Orange, N. J.
Wilton Bentley, Universal Electric Storage Battery Co., Chicago, Ill.
John R. Bensley, Randolph Motor Car Co., Chicago, Ill.
Claire Barnes, Billings & Spencer, Hartford, Conn.
Harold A. Baxter, H. H. Franklin Mfg. Co., Syracuse, N. Y.
Fred C. Burkhardt, The Crosby Co., Buffalo, N. Y.
Everett J. Cook, Faulkner-Blanchard Motor Car Co., Detroit, Mich.
Wm. E. Carpenter, Hibbard Engineering Co., Detroit, Mich.
A. L. Dyke, 3975 Washington St., St. Louis, Mo.
C. A. Erickson, Lozier Motor Co., Plattsburg, Pa.
Radclyffe Furness, Midvale Steel Co., Philadelphia, Pa.
Max H. Grabowsky, Grabowsky Power Wagon Co., Detroit, Mich.
Arthur A. Greenick, McCord Mfg. Co., Detroit, Mich.
Geo. E. Hazard, Hazard Motor Mfg. Co., Rochester, N. Y.
Wm. E. Taupt, L. A. Bergdoll Motor Co., Philadelphia, Pa.
Verne R. Lane, Milan, Mo.
Arthur C. Leverton, Brush Runabout Co., Detroit, Mich.
John McGeorge, Cleveland Motor Truck Co., Cleveland, O.
James A. McMichael, Carpenter Steel Co., Toledo, O.
Cyrus E. Mead, Reibold Building, Dayton, O.
Thos. H. Miller, Grabowsky Power Wagon Co., Detroit, Mich.
Burnett Outten, Packard Motor Car Co., Detroit, Mich.
Clive W. Richardson, Brush Runabout Co., Detroit, Mich.
Elmer R. Ritter, The Lunkenheimer Co., Cincinnati, O.

Preparing for Garden Show

EXHIBITORS DRAW FOR SPACES—MAIN HALL TO BE MUCH ENLARGED—TO CONTINUE FOR TWO WEEKS, THE FIRST FOR PLEASURE CARS ONLY

PREPARATIONS for the coming eleventh national automobile show at Madison Square Garden next January were discussed and in large measure perfected at a meeting of the board of managers of the A. L. A. M. last week. The meeting was well attended and its proceedings harmonious.

The business transacted included drawing for space on the main floor and in exhibition hall and the balconies. The floor space will be materially increased through rebuilding to a large extent the interior of the main hall.

The show will be divided into two parts, one devoted to passenger or pleasure vehicles and the other to freight or commercial cars. The first section will hold forth from January 7 to January 14 and the second will occupy the following week.

The first to draw for space was the Buick, followed by the Overland, E-M-F, Cadillac, Packard, Maxwell, Chalmers, Reo and Pierce-Arrow. The other cars which will occupy space on the main floor are as follows: Stearns, Thomas, Olds, Franklin, Dayton, Oakland, Lozier, Elmore, Winton, Locomobile, Hudson, Mitchell, Stevens-Duryea and Peerless.

Cars in the exhibition hall and balconies will include the following makes: Amplex, Moon, Mercer, Corbin, Bartholomew, Nordyke & Marmon, Knox, American, Matheson, National, Selden, Buckeye, Moline, Premier, Autocar, Columbia, Alco, Studebaker, Waltham, Inter-State, Ohio, Palmer & Singer, KisselKar, Hol-Tan, Chadwick, Speedwell, Regal, McIntyre, Marquette, Acme, Pierce-Racine, Flandrau, Hupmobile, Midland, Brewster, Courier, Simplex, Atlas, Dorris and Cartercar.

The show committee, which consists of Col. George Pope, chairman; Charles Clifton, Alfred Reeves and M. L. Downs, has devised an elaborate plan of decoration.

It was announced that a meeting will be called in the near future to allot space to accessory dealers and exhibitors of commercial or freight carrying cars, electric vehicles and motorcycles which will comprise section two of the show.

The Kissel Motor Car Company, of Hartford, Wis., was granted a license under the Selden patent at this session.

Charles Clifton, of the Pierce-Arrow Motor Car Company, head of the association, presided at the meeting, and in attendance were: James Joyce, American Locomotive Company; G. H. Strout, Apperson Brothers Automobile Company; J. S. Clarke and D. S. Ludlum, Autocar Company; O. Y. Bartholomew and R. A. Whitney, The Bartholomew Company; J. W. Lambert, Buckeye Manufacturing Company; W. C. Leland, Cadillac Motor Car Company; Hugh Chalmers and C. C. Hildebrand, Chalmers Motor Company; H. W. Nuckols, Columbua Motor Car Company; M. S. Hart, Corbin Motor Vehicle Corporation; W. R. Innis, E-M-F Company; G. H. Stillwell, H. H. Franklin Manufacturing Company; Elwood Haynes, Haynes Automobile Company; Howard E. Coffin, Hudson Motor Company; I. H. Page, Stevens-Duryea Company; G. A. Matthews, Jackson Automobile Company; A. N. Mayo, Knox Automobile Company; S. T. Davis, Jr., Locomobile Company of America; H. A. Lozier, Lozier Motor Company; F. F. Matheson, Matheson Motor Car Company; Benjamin Briscoe, Maxwell-Briscoe Motor Company; W. T. White, Mercer Automobile Company; W. E. Metzger, Metzger Motor Car Company; J. W. Gilson, Mitchell-Lewis Motor Company; W. H. Van Dervoort, Moline Automobile Company; M. J. Budlong, Packard Motor Car Company; L. H. Kittridge, Peerless Motor Car Company; Charles Clifton, Pierce-Arrow Motor Car Company; George Pope, Pope Manufacturing Company; H. O. Smith, Premier Motor Manufacturing Company; T. C. O'Connor, Pullman Motor Car Company; R. E. Ingersoll, Reo Motor Car Company; George J. Durham, Royal Tourist Car Company; G. E. Mitchell, Alden-Sampson Manufacturing Company; R. H. Salmons, Selden Motor Vehicle Company; F. B. Stearns, F. B. Stearns Company; W. R. Innis, Studebaker Automobile Company; Windsor T. White, Waltham Manufacturing Company; John N. Willys, Willys-Overland Company; Thomas Henderson, Winton Motor Carriage Company; Alfred Reeves, general manager.

Maxwell Wins First Buffalo Reliability

BUFFALO, Sept. 12—Maxwell car No. 12, Charles F. Munroe, driver, won the Laurens Enos trophy in the first annual reliability contest of the Automobile Club of Buffalo.

The winner was in the class selling for from $1,201 to $1,601, and showed a record of a perfect road score and only 5 points penalization in the final technical examination by the representative of the three A's.

The Hudson car, Tate driver, was second, having a technical penalization of 5 points, but losing by road penalty of 4 points. Oakland No. 7 was third, with a total penalization of 32 points, and the two Pullmans were tied for fourth honors with 36 points.

The first day's run knocked out five of the entries from the clean score class. These were Regal No. 2, three points; Maxwell No. 11, 22 points; Regal No. 14, 2 points; Reo No. 15, 21 points, and Oakland No. 18, 28 points.

The second day's run to Salamanca, took Parry No. 1 from the clean score class, and added 6 points to the Regal, three to the Maxwell and 30 to the Oakland, all three of which were penalized on the first day's run. The third day's run to Geneseo and return took the other Oakland and Hudson from the clean score class and added 7 points to the Parry No. 1, 47 to Maxwell No. 11, 42 to Regal No. 14, and placed 3 and 2 points respectively against the Hudson and Oakland.

The total road score was as follows:

No.		Wednesday	Thursday	Friday	Saturday	Total
1	Parry	0	3	7	4	14
2	Regal	3	6	0	0	9
4	Pullman	0	0	0	0	0
5	Pullman	0	0	0	0	0
7	Cartercar	0	0	0	0	0
11	Maxwell	22	3	47	14	86
12	Maxwell	0	0	0	0	0
14	Regal	2	0	42	0	44
15	Reo	21	0	0	0	21
17	Oakland	0	0	3	0	3
18	Oakland	28	30	0	0	58
20	Hudson	0	0	2	1	3

Chalmers No. 5 as it entered Chicago from the Glidden Tour—now declared winner

Motordom's Supreme Court

MANUFACTURERS' CONTEST ASSOCIATION SUGGESTS SUCH A BODY AND DISCUSSES CHANGES IN COMPETITION RULES FOR COMING YEAR

A SUPREME COURT of motordom was foreshadowed Friday at the meeting of the General Rules Committee of the Manufacturers' Contest Association, which was held at A. L. A. M. headquarters, when a Board of Appeals the function of which will be to review the findings of the Contest Board on appeal was suggested, discussed and referred to the directors for action.

One of the factors that worked to bring the matter to a focus was the dissolution of the temporary injunction given to the Premier company against the Contest Board, to prevent the latter body from turning over the Glidden 1910 Trophy to the Chalmers Motor Car Company. The decision followed the general line always taken by the Courts in ruling upon matters of sport—that is, it refused to upset the action of a duly constituted and authorized sport-governing body.

The contemplated Board of Appeals would serve to supply an ultimate tribunal such as was sought by the appellants in the various cases taken into the equity courts this year.

About twenty-five were in attendance at the meeting, which was presided over by Howard E. Coffin, president of the Hudson Motor Car Company. Alfred Reeves, S. M. Butler and A. L. McMurtry were present in an advisory capacity.

One of the matters that came up for consideration was a modification of the weight rule so that Ford cars and others of similar weight and power shall be rendered eligible.

The announcement was made that at the end of the current racing and contest season Alden L. McMurtry, chairman of the Technical Committee of the Contest Board, would retire permanently from that position, which he has filled acceptably.

Among the matters taken up by the committee were the following: That the decision of the Technical Committee shall be final with regard to the eligibility of any car to enter contests under the rules of the Contest Board; that importers shall be considered upon an even basis with domestic manufacturers in stock car and stock chassis events; that amateur drivers shall lose their standing as such by competing with professionals on track or road; that promoters shall charge certain amounts for entry; that entrants shall report to the starter or his assistant at least thirty minutes before the scheduled time of the first event of any race meeting; that an effort shall be made to interest the United States Signal or Engineer Corps as observers in national reliability tours; that a paid Technical Committee be placed at the disposal of the Contest Board next year; as to the use of demountable wheels; the length of time during which race drivers may continue at the wheel during long-distance events, such as 24-hour races, and several other matters.

Those who attended the session were as follows: Howard E. Coffin, A. N. Jervis, George H. Strout, G. W. Brown, Jesse Froelich, George Dunham, Herman G. Farr, A. L. Riker, C. A. Emise, F. F. Matheson, C. W. Matheson, M. C. Reeves, William G. Metzger, George M. Dickson, Homer George, H. O. Smith, W. B. Hurlburt, W. H. Vandervoort and Russell A. Field.

While the action taken by the committee is not formally final, the subsequent proceedings upon matters recommended and formulated is considered largely perfunctory on the part of the Contest Board.

Automobile Expense and Record Book

One of the latest innovations for the autoist who wants to know just what it costs to maintain his car is offered by H. C. Smith & Company, 61 Cliff Street, New York City. A pair of pages from the book are here reproduced and they will tell the story better than words. The book is 3 1-4 x 5 inches; opens endwise, and has enough pages to last for a whole year. The title page provides space for the name and number of the automobile, owner's name, also his address, the name and address of the chauffeur is provided for, and a space is given for the registration number of the car.

The idea incorporated into the Automobile Expense and Record Book as here referred to, has a utility foundation. A record such as this will be of value in determining the ratio of lubricating oil to gasoline, for instance. In the course of time it would be possible to decide as to whether or not it is an economy measure to repair tires to the greatest possible extent, or to avoid the cost of repairs and transfer the account to the purchasing fund with the idea of buying new tires more frequently. In the garage there are little problems to solve and this method of accounting will permit of reaching a decision as to the amount of money the garage keeper becomes the possessor of, some of which is for rental, to be sure, and the balance for articles purchased, and repair work done. Some garage keepers have a happy way of coaxing money out of the pocket of the automobile owner, and this little book would help to tell the tale should they succeed. Many owners in figuring on the cost of maintaining a car make the mistake of assuming that $30 per month, for instance, will be the total of the garage increment. With an efficient "coaxer" in charge of the garage it is possible to see $30 in the position of the small end of the horn.

Date	Gasoline		Oil		Grease	Tires	Inner Tubes	Repairs	Garage	Miscellaneous	
	Gals.	Cost	Qts.	Cost						Article	Cost
Forward											
Total											

Ferry	Hotel	Meals	Extras	Time Out	Time In	Mileage	Remarks

Specimen pages of the Smith Automobile Expense and Record Book—useful in keeping track of maintenance expenses

Motor Day at State Fair

MINNESOTA GRANGERS ADD INTEREST TO THEIR EXHIBITION BY PUTTING ON A PROGRAM OF AUTOMOBILE RACES

MINNEAPOLIS, MINN., Sept. 12—Motor day at the State Fair, Saturday last, was of greater importance than such affairs usually are. The feature was the track meet and because of the prizes offered by the State Fair people many racing stars were attracted. The Benz captured the mile track record, beating the Fiat's previous best of 50 4-5. The big Benz did 49:25; the Fiat, 49:35; the Darracq, 49:78, and the Buick Special, 50:61.

In addition to the record trials there were seven events contested, two of which were won by the Buick and one each by the Marquette, Fiat, Ford, Velie and Falcar. The feature of this section was the 5-mile free-for-all in class D in which the Fiat, Buick and Darracq met. This battle resulted in a victory for the first-named by a scant 2 seconds over the Buick, with the Darracq the same margin behind the place winner. Another free-for-all brought together some smaller cars and resulted in a victory for the Velie. Oldfield in his Knox started in this event and figured among the also-rans. The summaries:

One mile time trials—

No. Car	Driver	Time
5—Benz	Oldfield	:49.25
2—Fiat	De Palma	:49.35
6—Darracq	Kerscher	:49.78
19—Buick	Burman	:50.61

Class B, Division 2—161-230 Class, 5 miles—

9—Buick	Burman	5:11.36
7—Firestone-Columbus	L. A. Frayer	5:19.82
20—Cole 30	B. Endicott	5:20.12
21—Cole 30	G. Edmunds	5:22.25
8—Buick	Chrevolet	5:35.20
15—Staver-Chicago	Monckmeier	5:35.30
14—Staver-Chicago	Crane	5:50.10
10—Hudson	Gullic	5:56.30

5 miles—Free-for-all, Class D—

2—Fiat	De Palma	4:29
19—Buick	Burman	4:31.39
6—Darracq	Kerscher	4:33.12

5 miles—Handicap, Class E—

12—Ford	Hanson	:15	6:10.14
10—Hudson	Nyman	:25	6:26.54
25—Pullman	Hegland	...	6:47.45
24—Velie	Harford	:35	6:56.53

5 miles—Free-for-all, Class D—

24—Velie	Harford	5:57.98
15—Staver-Chicago	Monckmeier	6:10.68
20—Cole	Endicott	6:17.43
21—Cole	Edmunds	6:17.88
25—Pullman	Hegland	6:25.74
14—Staver-Chicago	Crane	....
1—Knox	Oldfield	6:29.25
22—Cutting	Clark	6:45
7—Firestone-Columbus	Frayer	6:48.73
28—Falcar	Gelnaw	....

5 miles—231-300 class, Class B, Division 3—

28—Falcar	Gelnaw	5:19.80
22—Cutting	Clark	5:29.05
27—Falcar	Pearce	5:40.38
25—Pullman	Hegland	6:21.10

10 miles, Class C, Division 4—301-450 Class—

No. Car	Driver	Time
3—Marquette	Chrevolet	9:28.66
23—Cutting	Clark	10:24.42
28—Falcar	Gelnaw	10:42.06
27—Falcar	Pearce	10:59.89
4—Marquette	Burman	....

Class E—Australian Pursuit Race, 9½ miles—

9—Buick	Burman	9:22.90
20—Cole	Endicott	9:27.38

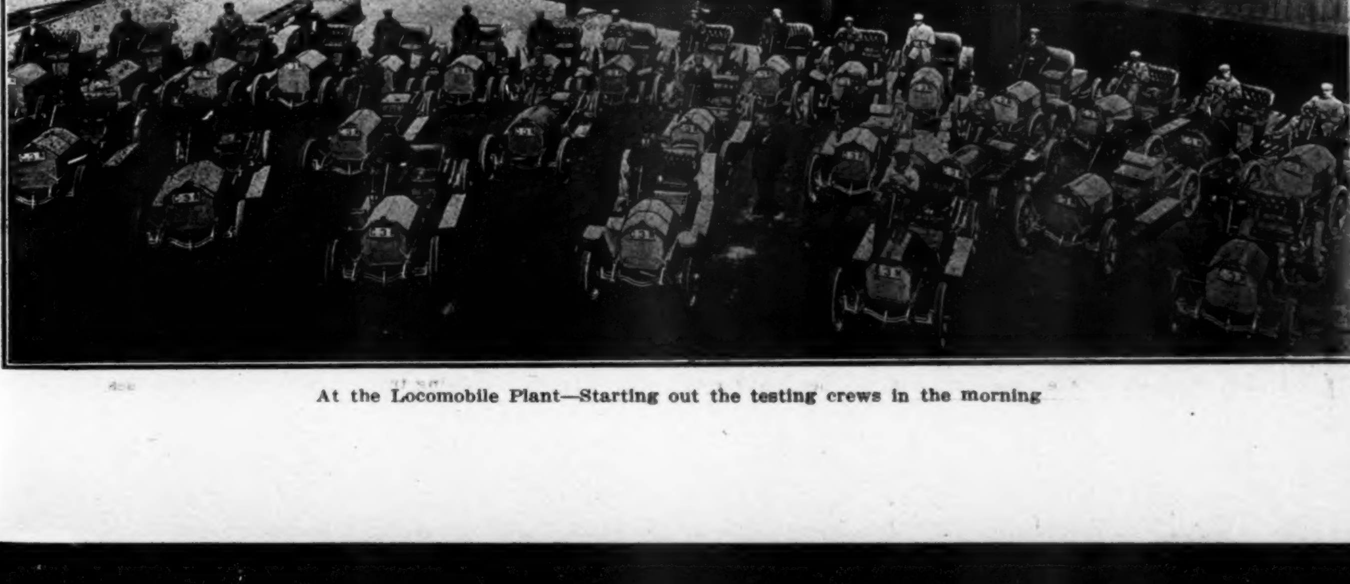
Third Annual Good Roads Convention at St. Louis

Delegates to the third annual Good Roads Convention, to be held at St. Louis, September 28, 29 and 30, will, besides listening to the opening address by Lewis R. Speare, have the opportunity of hearing read many excellent papers germane to the subject. Among them will be: "High Altitude Roads," F. L. Bartlett, Denver, Colo.; "Roads for Modern Traffic in the South," J. T. Bullen, Montgomery, Ala.; "Paved Roads," A. N. Johnson, State Engineer, Springfield, Ill.; "Modern Road Construction in the United States," Walter Wilson Crosby, Chief Engineer, Maryland Geological Survey; "Continuous and Systematic Road Maintenance," S. Percy Hooker, Chairman N. Y. State Highway Comm., Albany, N. Y.; "Farmers' Interest in Improved Highways," Hon. N. J. Batchelder, Master of National Grange, Patrons of Husbandry; "City Streets and Boulevards," Hon. James C. Travilla, Street Commissioner of St. Louis, Mo.; "Modern Surface Treatment of Various Roads," Charles W. Ross, City Street Commissioner, Newton, Mass.; "Town and Lateral Roads," Frank D. Lyon, Department Highway Commissioner of N. Y. State; "State Roads to Meet Modern Traffic Conditions," Harold Parker, Chairman Mass. Highway Commission; "Dustless Roads of Europe," Arthur Blanchard, of the Department of Civil Engineering, Brown University, Providence, R. I.; "Park Roads," John R. Rablin, Engineer, Metropolitan Park Comm., Boston, Mass. and several others.

The plans for the entertainment of the delegates are in the hands of the local committee, and include boat and trolley rides and the inspection of many of the industries of the city of St. Louis.

Studebaker Automobile Company Will Move

When a representative of THE AUTOMOBILE conferred with the Studebaker Company in relation to the question of moving, while the main fact was not denied, it was said that the New York building now occupied by the Studebaker Company is to be turned into a hotel, and it was learned through other sources that the company will probably move to a new building in the vicinity of Fifty-second street and Seventh avenue.



At the Locomobile Plant—Starting out the testing crews in the morning

Doings in the East

BOSTON TAXICAB COMPANIES TO INCREASE RATES—JERSEY MOTORISTS' INTERESTS INJURED BY SEVERE LEGISLATION—GOOD WORK OF SYRACUSE CLUB—TRADE NOTES

—The Lozier sales company of Boston has added T. A. Earl, formerly a Maxwell-Briscoe salesman, to its sales force.

—The Boston *American's* commercial vehicle contest will be held Oct. 20-21 instead of Oct. 14-15 as first announced.

—W. J. Jameson, who handles the Selden car in Boston, has just taken the Moline on, having secured a large territory for its sale.

—The Ingram-Richardson Enamel Company, of College Hill, Beaver, Pa., has orders on its books now for automobile tags for 1911 to total more than 500,000.

—The Reo Company has enlarged the territory of J. M. Linscott of Boston, who had all Massachusetts, giving him in addition Vermont and New Hampshire.

—The New Jersey Automobile and Motor Club has formulated a demand for the strengthening of the law which requires lights upon all horse-drawn vehicles after dark.

—The Keystone Sheet Metal Company of Ambridge, Pa., has completed its first lot of gasoline tanks for the Franklin Commercial Truck Company of Franklin, Pa.

—Fifty entries are already in for the *Herald* Sociability run, at Syracuse, N. Y., which is to be held Sept. 24. It is expected that there will be over 100 entries for it.

—Jack Wade, formerly automobile editor of the Boston *Journal*, has accepted the position of sales and advertising manager of the Grout Automobile Company, Orange, Mass.

—Manager J. E. Savelle, of the New England Motor Vehicle Company, agents in Boston for the Parry and Rainier cars, has resigned to take charge of a big garage to be built soon in the Hub.

—J. F. Dunlop, of the Dunlop Motor Co., Kilmarnock, Scotland, has contracted with the Motor & Mfg. Works Co., Geneva, N. Y., to manufacture on a royalty all Ejector mufflers used in Great Britain.

—C. J. Conolly, 443 Central Park West, New York City, is the local representative of the Randall-Faichney Company, of Boston, makers of the Jericho Horn "B"-Line Oil Gun and "Webster" Gasoline Gauge.

—Finishing touches are now being given to the first car manufactured at the Poughkeepsie plant of the F. I. A. T. Co. It is expected that machines will be turned out by the plant from now on, at the rate of one a day.

—A new company, headed by L. H. Wetherell, has been organized in Boston to handle the entire wholesale and retail business of the Croxton-Keeton car in New England. It is known as the Croxton Motor Car Company of Boston.

—The Cunningham Piano Company, of Philadelphia, has just put into operation a Hewitt motor truck, the capacity of which is 4,000 pounds. The truck hauls seven large pianos at one time and is expected to greatly facilitate rural and suburban delivery.

—G. D. Woodworth, formerly in charge of the Electric Pleasure Vehicle Department of the Philadelphia Studebaker branch, has been placed at the head of the Studebaker's E-M-F and Flanders "20" department on 18th below Spring Garden street.

—The race meeting scheduled for Sept. 9 and 10 at Providence, R. I., was declared off by its promoters. The projected meet was to have been a local affair if it had been conducted, as no application for sanction was made by the promoters to the Contest Board.

—The Central City Motor Car Company has been incorporated to handle the Haines car in Syracuse and Central New York. The president is A. G. Williams, of Syracuse; Arthur Hughes, of Elbridge, is treasurer and manager, and W. Curtis, also of Elbridge, is secretary. Temporary quarters are at 376 W. Fayette street.

—Richard G. Spavin, whose plant is located on Centre avenue, Pittsburg, has secured Arthur McClure from the Inter-State Sales Agency and Edward Gilmore from the Franklin automobile factory, of Syracuse, making a strong addition to its business force.

—A new firm has just been organized in Boston known as the McConnell & McCone Company to handle the Overland, formerly sold by the J. M. Linscott Company. Frank F. Wentworth, at one time New Hampshire agent for the Overland, is to be general distributer.

—All the motor clubs of New Jersey, representing as they do 25,000 automobile owners, are determined to elect to the Legislature this Fall only such men as will favor reciprocal laws, entitling tourists of other States to use the roads, without expense, for a limited period.

—The majority of the Worcester, Mass., dealers have received their 1911 models and had them on display for the first time at the Worcester Licensed Automobile Dealers' Association outdoor auto show, held in connection with the New England fair in that city.

—A change has been made in handling the Jackson car in Boston, E. P. Blake, who has had it for several years, turning it over to W. H. Bates, of Brockton. Mr. Bates had the Brockton agency for a long time. Mr. Blake is to devote his time to the commercial field with the McIntyre truck.

—The Automobile Club of Indian county, Pa., through Judge John P. Elkin, has offered $300 in cash in five prizes to those supervisors who would, during the remainder of this season, put the roads in their charge into the best possible condition. The prizes are $100, $80, $60, $40 and $20 respectively.

—The Worcester (Mass.) Automobile Club, acting with the other auto clubs of the State of Massachusetts, has started a campaign to get men from Worcester county in the Massachusetts Legislature who are favorable to the light bill which will compel vehicles as well as autos to carry lights at night.

—H. W. Brown, proprietor of the Binghamton Motor Car Company at Binghamton, N. Y., has begun work on a large garage. The size of the building is 66 by 130 feet, three stories in height. The building will be practically fireproof and fitted with modern appliances. The total cost will be about $26,000.

—Dr. H. L. B. Ryder of Poughkeepsie, N. Y., has let contracts for the construction of the first airship dock between New York City and Albany. G. Leslie Ryder is designing the garage and airship wharf. The work is to be rushed to completion; and the airship landing is to be large enough for either aeroplanes or two liners of the huge Zeppelin type.

—All is in readiness for the automobile races, in connection with the New York State Fair, which will be held at Syracuse, Sept. 17. Theodore Roosevelt will be a fair visitor that day and will act as honorary referee. There are three National entries and the Herreshoff and Maxwell teams are entered. There are a number of local entries, too.

—The legislation to be striven for by the New Jersey automobilists at Trenton next winter includes the elimination of the present fee of $1 from tourists, the proper enforcement of the light law, compelling all vehicles to carry lights at night, the grading of cars by the A. L. A. M. rating and not upon the manufacturer's rating, and the erection of sign posts.

—Earl J. Moon, sales manager of Moon Motor Car Company, will continue to make his headquarters in New York City, looking after the wholesale selling end of the Moon business in the

East. His latest big deal was in closing with the Linscott Motor Car Company, of Boston, for 250 cars. This concern has been allotted the New England States as its territory for 1911.

—Hartford Solid Motor Tires have been selected by the Wanamaker firm, of New York and Philadelphia, as regular equipment on its complete line of delivery wagons. The excellent service which the Hartford tires have given in the past, the splendid wearing qualities and the economy in actual use brought about the selection of this tire for the Wanamaker trucks.

—The Collins Gear & Motor Company has purchased the plant of the Simpson Stove & Mfg. Co. at Canonsburg, Pa., and will convert it into a factory for the manufacture of automobile axles, gears and motors. The company will also erect a building 60 x 300 feet. The officers are: J. J. Flannery, president; D. P. Collins, vice-president and manager; J. M. Flannery, secretary, and H. A. Neeb, treasurer, all of Pittsburg.

—The Automobile Club of Syracuse has put up this season nearly 200 steel-enameled route and danger signs in the adjacent territory and many special signs have been secured to warn tourists of dangerous places and to give information. The club employs a man and team constantly to post the notices. The territory covered stretches to Richfield Springs, 63 miles from Syracuse, and north to Henderson Harbor, about 60 miles away.

—The New Jersey Automobile and Motor Club contends that the business interests of the State are being greatly injured by the severe motor vehicle laws now upon the statutes. At a recent mass-meeting, called for the purpose of outlining a course of action that would procure remedial motor legislation from the next Legislature, it was pointed out that the automobile has resulted in the increase of the output of a great many New Jersey products.

—The Buick car is now represented in Hartford and Tolland Counties, Conn., by the Buick Garage Company, which for the present is located in the old Rambler quarters at No. 18 Elm street, Hartford, Conn. The Buick was formerly handled by the Miner Garage Company and later by an offshoot of that outfit, the Hartford Garage Company. Edwin Graham, representing the Buick interests, has been in Hartford for the past few days closing up the new deal.

—Harry M. Bronner, widely known in motordom, has assumed his duties as General Eastern Sales Manager of the Dayton Motor Company at the New York offices on West Fifty-seventh street. He will handle the Stoddard-Dayton line not only in New York but through branch houses in Brooklyn, Newark and other points. R. T. Newton will have charge at Newark and E. C. J. McShane at Brooklyn as soon as the new building in that borough is completed.

—At a meeting of the stockholders of the Chase Motor Truck Company the following were elected for the ensuing year: A. M. Chase, Syracuse, N. Y.; A. C. Chase, Syracuse, N. Y.; L. O. Bucklin, Little Falls, N. Y.; Geo. A. Brockway, Homer, N. Y.; H. P. Bellinger, Syracuse, N. Y. At a meeting of the directors immediately following the stockholders' meeting, the following officers were elected: A. M. Chase, president; H. P. Bellinger, vice-president; E. A. Kingsbury, secretary.

—The Boston taxicab companies have been granted an increase in rates, but not as fully as they petitioned police commissioners for two weeks ago. Beginning Sept. 20 the companies may charge 40 instead of 30 cents for the first half mile. The 10-cent limit for each quarter thereafter remains the same. A rate of 50 cents for the first half mile was asked for. For each person in excess of one they may charge 20 cents each. The waiting time for which 10 cents was charged, six minutes, remains the same, the companies asking to have it reduced to four minutes.

—Control of the R. L. M. Morgan Company, motor truck builders, of Worcester, Mass., has passed into a group of New York capitalists headed by Clair Foster, water registrar of New York City, and former managing director of the Standard Plunger Elevator Company. Ralph L. Morgan, founder of the business, will be vice-president of the concern and will have charge of the designing and engineering departments, while Henry E. Whitcomb, the present treasurer of the Morgan company, will continue in the same capacity, with Henry Mason Smith, of New York, as assistant. Henry Bennett Leary, of New York, will be the new secretary, and the board of management will include the following: Frederick A. Philips, Thomas H. Greenwood and Conrad N. Pitcher, all of New York, and John E. Bradley, R. L. Morgan and H. E. Whitcomb, of Worcester.

Middle West News

MINNEAPOLIS SELECTED AS NORTHWESTERN HEADQUARTERS FOR THE FRANKLIN—LOZIER MOVES TO DETROIT NOVEMBER 1—MANY NEW COMPANIES FORMED—INTERESTING ITEMS OF TRADE NEWS

—The Behen-Faught Motor Car Company has secured the St. Louis agency for Michelin tires.

—The St. Louis Automobile Company, 2714 Lafayette avenue, has become the agent for the Clark cars.

—The Phœnix Auto Supply Company has taken the agency for Missouri for Stromberg carbureters.

—The New Way Motor Company, of Lansing, has increased its capital stock from $100,000 to $350,000.

—James F. Gould, 200 Main street, Oshkosh, Wis., has been appointed representative of the Hupmobile.

—P. H. Boalen has been made manager of the Stein Double Cushion Tire Company at 5901 Euclid avenue, Cleveland.

—The name of the Bailey Motor Truck Co. has been changed to the Federal Motor Truck Co. M. L. Pulcher continues as general manager.

—The Rex Automobile Company has taken the agency for the St. Louis territory for the Atterbury Motor Car Co.'s trucks and commercial cars.

—The Fisk Rubber Co. of Cleveland has removed to its new building at 2931 Euclid avenue. R. J. Youngblood has been made assistant manager.

—F. E. McClure will open a branch house shortly in Cleveland for the Brush runabout. He will locate on Euclid avenue in "automobile row."

—The Illmo Motor Merchandise Company, accessory dealers of St. Louis, moved from 2230 Olive street to larger quarters at 1309 King's highway.

—Omaha and Des Moines automobilists have arranged for a sociability run between the two cities starting September 19, over the river-to-river road.

—Don C. McCord has taken the position of sales manager for the Marion cars, with office in factory No. 3 of the Willys-Overland Company at Indianapolis.

—H. Penner, a well-known Milwaukee business man, has succeeded J. D. Waite as general manager of The Petrel Motor Car Company, Milwaukee, Wis.

—Announcement has been made that Burton Parker will assume the duties of advertising manager of the Willys-Overland Company with headquarters in Toledo.

—The Detroit Garage Company, capitalized at $750,000, has filed articles of incorporation. Tryon W. Gorman and Edmund J. Baxter are the principal stockholders.

—L. L. Blood has accepted a position in the selling department of the Toledo Auto & Garage Company. For some time he has been selling the McFarland "Six."

—The Hoard Motor Car Company of Galion, Ohio, is taking bids on an automobile factory to cost $60,000, from plans by Architect Vernon Redding of Mansfield, O.

—E. W. Arbogast has severed his connection with the Badger Motor Car Co., and has become associated with the DeTamble Motors Co., as designer and general manager.

—The United Motor Detroit Company, formerly the Maxwell-Briscoe-McLeod Company, will have a branch store in Saginaw, where it will handle Maxwell and Columbia cars.

—Ralph Owen, general manager of the Owen Motor Car Company, and Mrs. Owen, are back from a 2,500-mile tour through the East, covering a period of two weeks.

—W. H. Lalley, European representative of the E-M-F Company, left recently for a trip which will include a swing around the circuit of both the British Isles and the Continent.

—An outgrowth of the Twin City Taxicab Company, the Alco Motor Car Company, of Minneapolis, has been organized to handle the Hudson, Baker and Alco in that territory.

—The Auto Shop Company, of Cleveland, in addition to its handsome new Euclid avenue salesrooms, has taken a long lease on the Fishel building, next door to its Vincent avenue garage.

—The National Gas & Gasoline Trades Association will meet in annual convention at Racine, Wis., one of the centers of the motor car industry in the West, on Dec. 12, 13, 14 and 15, 1910.

—The Haynes Automobile Company of 219 South Sixth street, Minneapolis, has been appointed territory distributor for the Cole "30." They will cover Minnesota and North and South Dakota.

—Morgan & Wright have decided to open a branch store in Denver located in the Majestic Building, 217 Sixteenth street. James Maginnis and Henry Althens have been put in charge of the new branch.

—The Chicago office and headquarters of the Bosch Magneto Company has been removed to 119-121 East Twenty-fourth street. The building is a two-story structure between Michigan and Indiana avenues.

—Interest in Detroit is for the time being focused on the automobile show which will be one of the big features of the State fair, opening September 19. The exhibit will be located in the handsome new building.

—The Regal Motor Car Company, of Detroit, has recently placed at the head of the sales department George D. Wilcox. Mr. Wilcox goes to Detroit from Syracuse, where he has been handling the Regal cars.

—Detroit may be chosen as the location of a plant for the manufacture of a new style transmission perfected by Clark W. Parker, of Springfield, Mass. Officials of the company are in the city looking for a factory site.

—The Rogers Unika Wheel Company, of Boston, is another prospective addition to the Detroit automobile colony. An option has been taken on a large tract of land, and it is the intention of the company to build a large plant.

—The Weber Implement Company has opened downtown salesrooms in St. Louis at Nineteenth and Locust streets, where the Mitchell, Lozier, and Rapid lines are displayed. The main offices will remain at 415 North Main street.

—Louis Geyler has been appointed agent of the Hudson car in the Chicago territory for the coming year. The agency is located at 1532 Michigan avenue until the new building between Twenty-fifth and Twenty-sixth streets is completed.

—Ralph W. Keeler has resigned as general manager of the Keeler-Hupp Company, Detroit, State distributors of Hupmobiles, and will engage in another line of business, retaining his present connections until a successor has been selected.

—The promoters of the Lisbon Auto Truck Company, of Lisbon, Ohio, which was all but ready to start work on a new plant there, are now negotiating for terms in East Liverpool, Ohio, where it is possible the new plant may be located.

—The Missouri Taxicab Company has been incorporated in St. Louis, with Walter Isaacs, 131 shares; Herman Rindskop, 116 shares; Clara Isaacs, 1 1-2 shares, and Addie Rindskop, 1 1-2 shares, incorporators. The paid-up capital stock is $25,000.

—The Studebaker Automobile Company this week shipped the last train load of electric delivery wagons to Gimbel Brothers, New York. This is the last of an order for 66 machines placed by the Gimbels with the Studebaker concern a few months ago.

—The Scioto Auto Company, organized recently with an authorized capital of $150,000, of which $85,000 has been subscribed, will take over the plant of the Arbenz Furniture Company at Chillicothe and will remodel it into an up-to-date automobile plant.

—Racine (Wis.) stockholders in the Thomas Brass & Iron Company and allied companies failed to win their fight to have the plants locate at Racine. The factories at Waukegan, Ill., were destroyed by fire recently. They will be rebuilt at Chicago Heights.

—The Bower Roller Bearing Company is erecting a new plant at Goethe and Hart avenues, Detroit, which will be ready for occupancy this fall. It is to be of concrete construction, 220 feet long, 90 feet in width at the widest point and 60 at the narrowest.

—The Regal line of automobiles, which has been handled up to the present in St. Louis by the General Motor Car Company, will in the future be taken care of by the Grand Motor Car Company, an organization that has just been completed by R. W. Anslem.

—The third annual meeting of the stockholders of the Royal Tourist Car Company for the election of directors and the transaction of business generally will be held on Wednesday, September 21, at 533, Society for Savings, Cleveland, Ohio, at 11 o'clock a. m.

—The crowning feature of last week's convention of Ford Motor Company branch managers from all over the United States and Canada, and from abroad, was the dinner given Wednesday evening in the new convention hall of the Hotel Pontchartrain, Detroit.

—Minneapolis will collect taxes next year on $1,425,300, representing the assessment on automobiles. There are 2,630 machines on the tax lists this year, compared with 1,325 last year. The average of valuations also has jumped. Last year it was $513; this year it is $542.

—The Cummings Auto Sales Company, organized recently with an authorized capital of $20,000, has taken the salesrooms at 153 North Fourth street, Columbus, Ohio, formerly occupied by the Burdell Auto Sales Company. The company will have the Central Ohio agency for the Elmore.

—The Lisbon Auto Truck Company has been formed with a capital of $50,000 and will build a plant at Lisbon, Ohio, for the manufacture of small motor trucks for the use of grocers, hucksters, etc. Among those most largely interested are A. H. Wyatt and W. A. Kitto of Cleveland, O.

—The new officers of the Ideal Electric Company are as follows: Bruce Borland, president; Edwin W. Ryerson, vice-president; Uri B. Grannis, treasurer; Cyrus H. Adams, Jr., secretary, and C. J. Holdrege, general manager. The capital stock of the company has been raised to $50,000.

—The Pierce-Racine car, manufactured by the Pierce Motor Company of Racine, Wis., will hereafter be known as the Case and will be distributed exclusively by the J. I. Case Threshing Machine Co. of Racine, the oldest builder of traction and threshing machinery in the United States.

—The Enger Motor Car Company, of Cincinnati, manufacturer of the Enger automobile, has closed contracts with the Federal Motor Car Company, of Chicago, for 200 cars for 1911. The representative of the Federal company, after visiting the Enger plant, decided to handle the Enger in the Chicago territory.

—The Rubber Products Company of Barberton, O., has increased its capital stock from $150,000 to $300,000. Part of the stock will be given to the stockholders as a stock dividend, and

the remainder sold at par pro rata. The increased capital will be devoted to increasing the size and equipment of the plant.

—At the annual meeting of the Firestone Tire & Rubber Company, of Akron, held recently, the old board of directors was re-elected and officers were selected as follows: H. S. Firestone, president and general manager; Will Christy, vice-president; S. G. Carkhuff, secretary, and J. G. Robertson, treasurer.

—The American Tire and Rubber Company of Akron, Ohio, was incorporated with an authorized capital of $200,000 to manufacture and sell all kinds of rubber articles, including automobile and motorcycle tires. The incorporators are: Frank L. Kryder, Adam Duncan, Gilbert C. Waltz, Harvey Musser and J. R. Huffman.

—Minneapolis has been selected by the H. H. Franklin Company of Syracuse, N. Y., as headquarters for their northwestern traveling representative, George S. Rule. His territory includes Minnesota, North and South Dakota, Wisconsin and Northern Michigan, and he has established headquarters at Robertson Motor Company's office at 111 Tenth street, South.

—The Scioto Auto Car Company of Chillicothe, recently incorporated, has been organized by the election of the following directors: Fred G. Stroehmann, Henry J. Arbenz, C. A. Fromm, H. C. Ogden, Wheeling R. Enderlin, Robert W. Manly and F. C. Arbenz. Fred G. Stroehmann was elected president; W. R. Enderlin, vice-president and F. C. Arbenz, secretary and treasurer.

—In accordance with a State requirement the United States Motor Company, Jersey City and Detroit, capital $30,000,000, has filed articles of incorporation with the Secretary of State at Lansing. Other concerns to follow suit are the Alden Sampson Manufacturing Company, Pittsfield, Mass., and Detroit, $300,000, and the G. & J. Tire Company, New York and Detroit, $10,000.

—The McLeary Engineering Company has been incorporated at Toledo by Edward McLeary, Oliver P. Barnhart, Reuben Y. Barnhart, Samuel J. Logan and John F. Kumler, Jr. It has an authorized capital stock of $25,000 and will take over and expand the business of Ed. McLeary, who for years has conducted a machine shop. Both air and auto motors will be added to the output of the concern.

—Studebaker Bros. Manufacturing Company has opened a temporary automobile branch in St. Louis at Tenth and Locust streets in the building formerly occupied by the Midland Automobile Company. Until recently the branch in St. Louis was conducted under the name of the E-M-F Automobile Company, but by present arrangements the Everitt-Metzger-Flanders Company merges its interests in this territory. T. L. Hausmann is manager of the Studebaker company.

—The removal of the general offices of the Lozier Motor Company to Detroit, Michigan, will occur Oct. 1, on the completion of the new factory at Detroit. F. C. Chandler, formerly manager of the Western Sales Agencies and foreign department, has been elected to the vice-presidency of the company, and will be in charge of the sales department; C. A. Emise assumes charge of a new department of publicity and advertising and W. S. M. Mead, who succeeds Mr. Emise as manager of the New York and Metropolitan Agencies, will also have charge of the foreign department, with headquarters at 1751 Broadway, New York City.

—At the annual meeting of the stockholders of the K-R-I-T Motor Car Co. at Detroit, it was decided to add two more stories to the plant at the foot of Lieb street, increasing the capacity to 5,000 cars per year. Directors were elected as follows: W. L. Piggins, B. C. Laughlin, Kenneth Crittenden, William Van Sickle, L. C. Sherwood, J. W. Kanter and George G. Harris. The new officers are: President, W. L. Piggins; vice-president, Kenneth Crittenden; secretary and treasurer, B. C. Laughlin; manager of sales, J. E. Winney. The company will add to its line this year a surrey model for four passengers. The K-R-I-T Motor Sales Co. has been organized to handle cars of this make and will be located at No. 461 Woodward avenue, with Thomas C. Harris in charge.

The South and the Coast

PREPARING FOR ATLANTA'S FALL SPEEDWAY RACES —IMPROVING THE LOUISVILLE-NASHVILLE TURNPIKE—LOS ANGELES DEALERS ABANDON RACING—OREGON STATE A. A. MEETS TO-DAY

—The city of Harrisonburg, Va., has installed two motor cars in the headquarters of its water department.

—Walter E. Smith, Louisville agent for the Matheson car, has joined the salesforce of the Olds Motor Works.

—The Murray Motor Car Company has entered the Seattle field and is located at 1716-18 Broadway. This company has taken on the Hudson car and the Gabrowsky power wagon.

—Charles E. Miller & Bro. have secured the agency for the Owen in Washington, D. C., and vicinity and will be located on Fourteenth street, in the heart of the capital city's motor row.

—F. A. Mitchell, one of the veteran automobile men of Seattle, who has been away from that city for the past two years, has purchased the garage of the White Motor Company on Broadway.

—Edward E. Gerlinger has taken the agency in Portland, Ore., for the Stoddard-Dayton. The agency will cover the State of Oregon and will be known as the Stoddard-Dayton Automobile Company.

—Among the agencies for the Owen closed during the past ten days are: J. P. Burrus, McKinney, Tex.; John Ackard & Sons, Colby, Kan.; O. J. Merrill, Edgar, Nebr.; Bert Gilhousen, Los Angeles, Cal.

—The Standard Auto Equipment Corporation, of Richmond, Va., has been granted a charter by the Virginia Corporation Commission. The incorporators of the company are: B. C. Patte, president; C. Ridgeway Moore, vice-president, and George A. Perry, secretary and treasurer.

—Richmond, Va., is considering motorizing her fire department. A representative of the city has been away inspecting machines at various points and has returned much pleased with the demonstrations.

—After a stormy session, the Licensed Motor Car Dealers' Association of Los Angeles voted to take no further part in racing events of any kind, but will permit members of the association to enter races at their will.

—The Kentucky Automobile Company has secured a building adjoining its present location on Third avenue, south of Breckenridge street, and is moving its offices to that structure. The company is the agent for the Cadillac cars.

—Two Louisville automobile houses have exhibits at the Applachian Exposition at Knoxville, Tenn., September 12 to October 12. The Olds Motor Works and the Studebaker Automobile Company will show machines.

—One of the latest cars to enter the Baltimore field is the Everitt, the agency for which has been taken on by the Pullman Automobile Company, Inc., with office at 1117 Cathedral street and garage and repair shop at 1803 Lovegrove alley.

—Kentucky and Tennessee motorists and citizens living along the line of the old Louisville and Nashville turnpike are agitating the question of improvements for that important and historic highway. A meeting is to be held at or near Smith's Grove in the near future to discuss ways and means of procedure. The road in question received a good deal of undesirable advertising following the 1910 Glidden tour.

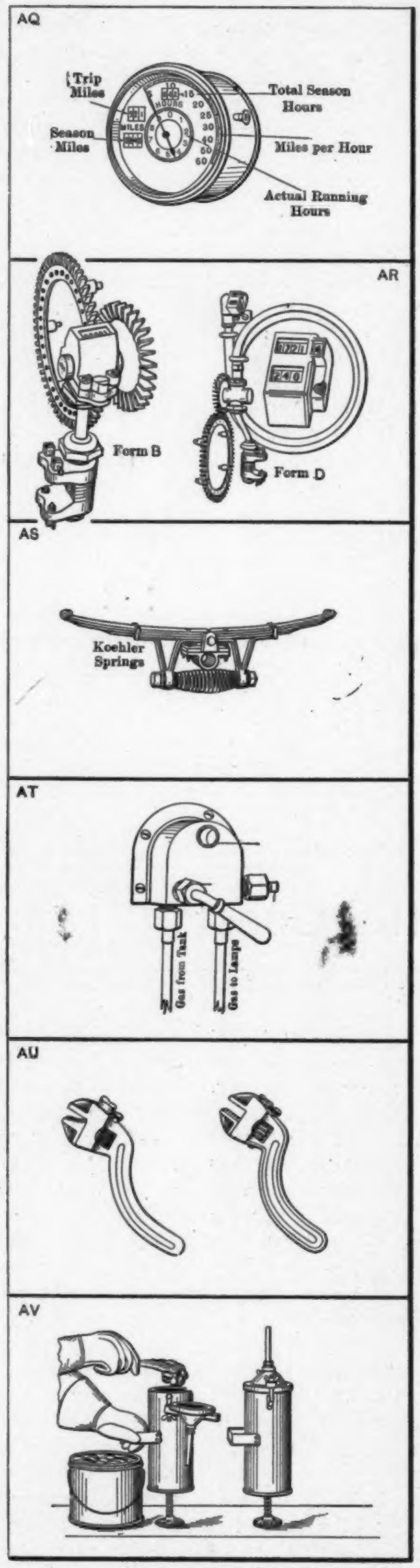
Seen in the Show Window

IN these days of stringent speed laws it is sometimes convenient for the autoist to know exactly how fast he is driving, how long he has been upon the road and how far he has traveled. In the Cleveland Speed Indicator (AQ), made by the company of the same name at 1806 Euclid avenue, Cleveland, O., he is provided with a device which tells not only the miles per hour, the trip hours and trip miles, but the season hours and the season miles. The running time record will be excellent evidence for every law-abiding motorist in the event of police interference, as the indicator shows at all times the number of miles and the running time. The instrument is kept in motion by a flexible shaft connection to the automobile wheel. The fastest moving part of the indicator revolves only 30 times for each mile.

A MAKER who regularly equips his cars with the Veeder Odometer (AR), made by the Veeder Mfg. Co., 22 Sargeant street, Hartford, Conn., gives evidence of a confidence in the reliability of his wares that should go far to convince a prospective customer of the honesty of his claims, for this little instrument will act as a tell-tale should he overrate the battery mileage, gasoline and oil consumption, tire mileage or the longevity of the various parts. The dashboard type of odometer has two registers—a total and a trip. The trip can be set back to zero at will; the total cannot be set back. The type of odometer which is designed for attachment to the front wheel is also shown; it is regularly supplied for use on the left wheel, but can, when so ordered, be supplied for the right front wheel.

ROUGH roads deliver hammer blows to the wheels, tires and mechanism of an automobile that would materially shorten their life were it not for the springs. But to successfully cope with such conditions the springs must be necessarily so stiff-acting that riding in a car thus equipped is tiresome in the extreme. The Koehler Cantilever Spring (AS), made by the Universal Auto Spring Company, 8500 Florissant avenue, St. Louis, Mo., is designed to withstand heavy shocks and yet be sufficiently "soft" in action to insure comfortable riding. The company claims that with these springs the use of solid tires on pleasure cars is rendered quite possible; shocks on the engine and the road wheels are minimized, and the life of pneumatic tires lengthened.

WASTEFULNESS in the use of acetylene gas on automobiles costs considerable money in the aggregate. The trouble of lighting and relighting lamps with each succeeding stop when traveling at night usually induces the autoist to allow his lights to remain burning, regardless of the length of the stay. It is to remedy this very situation that the Inst Lighter (AT) has been perfected by the company of the same name at 53 East Main street, Columbus, O. By a turn of a handle and the push of a button the driver of a car, without leaving his seat, has instant control of the lighting and extinguishing of his head lamps. The lighter is installed on the dash and takes up but little room.



AQ—The Cleveland Speed Indicator
AR—Veeder Odometers—for wheel and dash
AS—The Koehler Cantilever Spring
AT—Inst Lighter saves the autoist money
AU—B. & S. Wrenches for tight places
AV—The Little Giant Grease and Oil Gun

THE location of some of the nuts and pipes in the mechanism of an automobile makes them so difficult of access that in the event of their needing tightening the ordinary form of wrenches is found practically useless for the purpose. The Billings & Spencer Co., of Hartford, Conn., realizing the necessity of a new form of wrench to enable the motorist to reach the otherwise un-get-at-able nuts and pipes, has designed the B. & S. adjustable wrenches (AU) here shown. The curved handle enables one to get the jaws of the wrench onto a pipe or a nut that could not be reached with a straight-handled tool. These wrenches are made of drop forged steel and are fitted with a patent nut lock to prevent slipping.

LUBRICATING gear cases and differentials is a nasty job under ordinary conditions. Greasy hands and gloves, soiled clothing and smudged features are the usual accompaniments of the process. In an effort to ameliorate these conditions the Neiman Machine Works, of Freeport, Ill., have designed and are marketing the Little Giant Grease and Oil Gun (AV) The device consists of a metal cylinder holding a quart of oil or 2 1-2 pounds of grease; a removable cover and spout, and a screw piston to quickly propel the lubricant to the point where it is needed. A side handle makes the gun easy to carry.

MAKERS of lubricants, cleaning compounds and other materials that must be sealed in cans will find something to interest them in the announcement that L. & J. A. Steward, of Rutland, Vt., have perfected a machine for sealing open-top cans after being filled. The filled cans, with covers laid on top, are placed on a feed belt, which carries them to a header, where the covers are forced on and fastened. From there the cans are taken to the dial plate, where each can, remaining stationary while the head revolves, is automatically sealed.